# NKJA

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## About The Covers

*Front cover*: Claudia Faye is a Visual Communication Design student at Northern Kentucky University whose work reflects a strong commitment to community engagement. She actively contributes her creative talents to local events, blending design with meaningful public interaction. Her work has been featured in the Juried Student Show at NKU and the SOS ART Exhibition at the Art Academy of Cincinnati. As she continues to develop her practice, Claudia remains dedicated to building a dynamic career rooted in both design excellence and community involvement. "Approaching this project, I wanted to create a piece that felt relevant not only to NYSA and the students at NKU, but also to the broader world today. Many of you have likely seen or heard about the Artemis II launch; an incredible demonstration of human advancement and our continued pursuit of knowledge through exploration and research.

I connect that sense of discovery back to NKU, using it as a source of inspiration for students, and for all of us, to keep learning, questioning, and pushing the boundaries of what we know. My design reflects this idea through unifying elements, particularly the subtle incorporation of NKU's yellow and black color palette, symbolizing both school pride and a shared drive toward progress."

*Back cover*: Carly Sallaz. "Before starting on the design process I researched about the Nýsa student journal. I sourced previous editions and admired their covers. Also I made note of the content most of them contained. To me it seemed people and human centered so I used a photo of students collaborating. I wanted an overall sci-fi abstract feel so I selected a futuristic font and an abstract pattern. For the colors I chose a very norse yellow to represent Northern Kentucky University and an indigo type color to compliment it."

# NÝSA, THE NKU JOURNAL OF STUDENT RESEARCH

*Nýsa* publishes research from students at NKU and across the commonwealth. It is published by NKU's Institute for Student Research and Creative Activity. All submissions are peer-reviewed by NKU faculty and students.

## About The Title

Names are tricky things. Journals of student research are relatively common, and in looking for a name, it was important to find something evocative of the intellectual effort and exhilaration that accompany any research endeavor. If it could relate to our identity as The Norse, all the better. "Nýsa" worked perfectly. In the words of David Kime, Advising Coordinator for NKU's Honors College, who suggested it:

"The Viking raids were only one aspect of Norse society. The Norse were shipbuilders, farmers, philosophers, poets, artists, and merchants. The Norse were explorers who engineered new shipbuilding technology and navigation techniques. They sought new knowledge in the stars and from distant lands and cultures. In Old Norse, "nýsa" is a verb meaning to search or investigate; to peer into the unknown. The idea of "nýsa" applies to today's NKU students as much as it did to the Norse a thousand years ago as they peer into the unknown and produce new and exciting examples of research, scholarship, and creativity."

## From The Editor

Topics of articles in *Nýsa* seem to ebb and flow—some years we're awash in political science, others feature a strong current of social work… this year economics is the dominant field. But among those there's always a glimmer from other fields. This year it's *Nýsa*'s first contribution from History. This variety is one of the strengths and delights of *Nýsa*. As you read this year's contributions, remember that this is just a glimpse of the myriad ways that student research and scholarship is occurring at NKU. Think of it as the unseen depths of research here. And if you are reading this and have some research you are working on or have completed, send it flooding our way.

Thanks as ever to our dedicated reviewers, mentors, our fantastic editorial team, and the tireless support of NKU's Institute for Student Research and Creative Activity. Your efforts are what has made this volume, and all future volumes, possible.

Patrick M. Hare

## Editorial Board

# Wages and the Price of Goods in Statewide Markets After a Mass Deportation Event: An Analysis of Operation Wetback

***Carter Warthman***
***Faculty mentor: Linda Dynan***
*Economics*

**KEYWORDS:**
mass deportations, emigration, wages, personal income, price of consumption goods, consumer price index, Operation Wetback

## Carter Warthman

Carter Warthman will graduate from the Northern Kentucky University Haile College of Business in May 2026, obtaining a Bachelor of Science degree in Economics. Carter was honored to have been part of NKU's economics program, where he was mentored by Dr. Linda Dynan both on this project and in many of his favorite academic courses. While Carter is currently pursuing a J.D. at NKU Chase College of Law through the accelerated 3+3 program, this project helped instill him with an exceptional passion for economics that he hopes to carry into the future.

## Abstract

The election of President Trump in 2024 brought immigration policy, and its economic consequences, back into the forefront of American politics. In the face of mass deportations, this study aims to identify how a mass deportation event will impact wages and the price of goods. The mass deportation event studied is named "Operation Wetback," wherein hundreds of thousands of Mexican immigrants were removed from Los Angeles, Houston, San Francisco, and Chicago in the Summer of 1954. A difference-in-difference approach is used to determine the impacts of deportations on personal income and the consumer price index of each city affected, using the city of Cincinnati as a control group. The results indicate that deportations under Operation Wetback did not have a statistically significant impact on the personal income and CPI in the cities affected by deportations, though the coincidence of the baby-boom generation appears to negate the impacts of Operation Wetback.

## Introduction

The election of President Trump in 2024 brought immigration policy and its economic impacts to the forefront of American politics. Americans appear worried about the economic consequences of strict immigration policy, which includes a staple promise of the President's campaign: mass deportations.

The objective of this study is to estimate how prices of goods and services, including consumption goods and wages, are impacted by forced emigration events. Many economists have investigated the impact of immigration on local economies over the past several decades; however, the economic impacts of emigration, or the act of exiting a country, have not been as widely studied. In context, mass deportation events can be described as forceful emigration of a foreign-born population from a host country.

### Background

The population of the United States has exploded since the 1980s; increasing from more than 226 million residents in 1980 to more than 331 million residents in 2020 according to the Census Bureau (US Census Bureau. "Historical Population Change Data (1910-2020)."). Today, immigrants "account for 14.3% of the U.S. population, a roughly threefold increase from 4.7% in 1970" (Moslimani, 2024). As of 2022, Latin America represented 27% of the immigrant population, Asia represented 28%, and all other immigrants represented the remaining sum. Likewise, most immigrants (77% as of 2022) are authorized to be in the nation. Of the immigrant population in 2022, 49% were naturalized citizens, 24% were lawful permanent residents, and 4% were legal temporary residents, leaving 23% as unauthorized immigrants.

The term to refer to unauthorized immigrants is not "illegal immigrant." Rather, it is "undocumented immigrant," because being in the United States unauthorized is a civil matter, not a criminal one. Under 8 USCS § 1325, illegal entry into the United States is a misdemeanor (8 USCS § 1325). However, roughly 40% of immigrants who entered the United States in 2023 had done so legally and overstayed their visas (Buchholz, 2025).

Lawfully permitted immigrants may be able to attain jobs, while others can be permitted to enter and live in the United States under programs like the H1-B visa, which requires sponsorship by an employer. According to the Bureau of Labor Statistics, "in 2023, foreign-born workers were more likely than native-born workers to be employed in service occupations (21.8 percent versus 15.0 percent); natural resources, construction, and maintenance occupations (13.8 percent versus 7.8 percent); and production, transportation, and material moving occupations (15.2 percent versus 11.8 percent). Foreign-born workers were less likely than native-born workers to be employed in management, professional, and related occupations (36.1 percent versus 45.4 percent) and in sales and office occupations (13.0 percent versus 20.1 percent)" (Bureau of Labor Statistics, 2024). The report concludes, "in 2023, the employment-population ratio—the number of employed people as a percentage of the civilian noninstitutional population—of the foreign born increased to 64.2 percent," indicating that a greater proportion of the foreign-born population (64.2%) was employed relative to the native-born population (59.5%). In the same 2023 Bureau of Labor Statistics report, "median usual weekly earnings of foreign-born full-time wage and salary workers ($987) were 86.6 percent of the earnings of their native-born counterparts ($1,140)." The difference of ~14% less in median wage and salary indicates that foreign-born workers are paid less than native-born workers.

Those in support of mass deportations argue that the presence of immigrants will result in less available jobs for American-workers. According to Steven Camarota, director of research for the anti-immigration think-tank Center for Immigration Studies, "They crowd out the native-born…But putting that aside, the worst aspect of immigration is that it lets us say: 'Who gives a shit? We'll just hire the eager immigrants. And if all these men are on the sidelines in rural America or in cities, what do I care? I got this eager immigrant who's willing to fix my roof or work at McDonald's or babysit my kid — babysitting wouldn't be what men do — or work in construction or be a janitor.' And I think that's why it's so bad" (Sutton, 2025). Economically, this is the idea that immigration is a "zero-sum game", or that if an immigrant-worker receives a job, then an American-worker is going without a job.

The study of mass deportations herein was unable to find substantial evidence to support the idea that immigration, and its impacts on the local economy, are a zero-sum game. However, prior research on the topic suggests links between "zero-sum"-thinking and anti-immigration biases. Dr. Stefanie Stantcheva, Ropes Professor of Political Economy and founder of the Harvard Social Economics Lab, found "that zero-sum thinking can help explain variations in policy views within parties—Democrats who hold more zero-sum views tend to be more strongly opposed to immigration" (Farrar, 2025). This indicates that anti-immigration sentiment may be motivated by bias rather than empirical evidence on the economic impacts of immigration.

Regardless, nativist sentiments have spiked. According to Statista, nearly 64% of respondents say they are dissatisfied with the level of immigration into the country today, with only 28% claiming they are satisfied (Gallup, 2024). This dissatisfaction generates a desire for incoming immigrants to be vetted by federal officers and removed if deemed necessary.

The Department of Homeland Security refers to the return of immigrants to their country of origin as "repatriation."

Repatriations can take several forms, including "returns" (repatriation without penalties), "removals" (repatriation with penalties), and "Title 42 expulsions" (repatriation related to public health and safety). Likewise, immigrants can be removed if they commit a crime in the US or have a criminal history in their country of origin. A Title 42 expulsion refers to Title 42 § 265 of the US Code Service, which allows the United States Surgeon General to prohibit the introduction of immigrants or property from a foreign country into the US when there is a dangerous widespread communicable disease that poses risks to US health in the foreign country (42 USCS § 265). Title 42 was activated during the COVID-19 pandemic from 2020 to 2022.

In 2014, the total number of repatriations was 568,520. In 2016 the total decreased to 437,990. By 2021 the total increased dramatically to 1,334,210 repatriations; 1,071,070 (80.27%) of which were Title 42 expulsions. In 2024, Title 42 expulsions ended and no repatriation in this year was a Title 42 removal. As a result, the total number of repatriations dropped to 777,580 (Office of Homeland Security Statistics, 2025). Most repatriations since 2014 occurred while President Biden was in office from 2021 to 2024, and the dramatic increase can likely be attributed to the Title 42 expulsions during the COVID-19 pandemic. Over those four years, the total number of repatriations was 4,779,640 repatriations (58% of repatriations since 2014).

After taking office in January 2025, the Trump administration took a radical approach to immigration: attempting to end birthright citizenship, attempting to employ the Guantanamo Bay facility as an immigrant detention camp, and ordering the US military to assist in flying immigrants out of the country. As of February 21st, 2025, the Trump administration reportedly deported 37,660 immigrants, "far less than the monthly average of 57,000 removals and returns in the last full year of Joe Biden's administration" (Hesson, 2025). Regardless of the relative deportation levels, the Trump administration called for more arrests and more repatriations, indicating further this administration's hardline approach to immigration.

## Economic Convention and Prior Study

What can be expected when immigration occurs? Initially, an increase in the immigrant-population would lead to an increase in the total population. Under economic convention, an increase in population would yield an increase in the total labor supply ($L_S$) and the total demand for consumption goods ($D_{Consumption\ goods}$) simultaneously:

$$L_S^{Immigrant\ population} \uparrow \Rightarrow L_S^{Total\ population} \uparrow$$

$$D_{Consumption\ goods}^{Immigrant\ population} \uparrow \Rightarrow D_{Consumption\ goods}^{Total\ population} \uparrow$$

Assuming competitive labor markets, it can be concluded that an increase in labor supply will place a downward pressure on wages ($\omega$) in the short run, while an increase in demand for consumption goods would place an upward pressure on the price of consumption goods ($P$) in the short run:

$$L_S^{(Total\ population)} \uparrow \Rightarrow \omega \downarrow$$

$$D_{(Consumption\ goods)}^{(Total\ population)} \uparrow \Rightarrow P \uparrow$$

The downward pressure on wages would result in an increase in labor demanded ($L_D$). Capital is fixed in the short run; therefore, the short run impact of an increased immigrant labor supply is the substitution of other inputs of production, like native workers with relatively low-productivity or low-skill native workers receiving a relatively higher wage-rate. Likewise, in the short run, there is a relative increase in demand for consumption goods which will pressure firms into increasing production.

$$L_S^{(Total\ population)} \uparrow \Rightarrow \omega \downarrow \Rightarrow$$

$$L_D^{(Immigrant\ population)} \uparrow + L_D^{(Native\ population)} \downarrow$$

Some firms will observe an increase in demand for their products and be party to cheaper wages in the labor markets. Certain firms may respond by increasing production further:

$$D_{Consumption\ goods} \uparrow \Rightarrow P \uparrow \Rightarrow L_D \uparrow \Rightarrow S_{Consumption\ goods} \uparrow$$

By convention, in the long run, all markets will return to equilibrium. Indicating that over time, prices for consumption goods will decrease and wages will increase to equilibrium:

$$L_S^{Total\ population} \uparrow \Rightarrow \omega \downarrow \Rightarrow L_D^{Immigrant\ population} \uparrow + L_D^{Native\ population} \downarrow$$

$$D_{Consumption\ goods} \uparrow \Rightarrow P \uparrow \Rightarrow L_D^{Total\ population} \uparrow \Rightarrow \omega \uparrow + S_{Consumption\ goods} \uparrow \Rightarrow P \downarrow$$

However, empirical studies have suggested that when immigration occurs, there is a negligible impact on wages and an overall decrease in the price of consumption goods.

For instance, Miami, Florida was subject to a large-scale immigration event in 1980 called the Mariel Boatlift, wherein about 125,000 Cuban immigrants flooded into the Miami labor force between April and October of 1980, fleeing Fidel Castro's regime. Initially, the immigrants were collectively looking for asylum in the South American embassies in Cuba. However, Castro spontaneously allowed all asylum seekers to leave if they wished, furnishing them with passports and the right to safely emigrate. Many made their way to the city of Miami roughly 200 miles away after US president Jimmy Carter declared the event a humanitarian emergency.

The result was a "7% increase in the labor force of Miami and a 20% increase in the number of Cuban workers in Miami," according to Nobel-prize winning economist David Card (1990). After analyzing hourly wage rate data in Miami

between 1979 and 1985, Card (1990) determined that the Mariel Boatlift "had virtually no effect on the wage rates of less-skilled non-Cuban workers." The evidence also suggested that "even among the Cuban population there is no indication that wages or unemployment rates of earlier immigrants were substantially affected by the arrival of the Mariels" (Card 1990). This analysis indicates that in the 6-year time span studied, there is a negligible impact on the hourly wage rate among the native workers. Card (1990) also recognizes that the non-Cuban immigrant population of Miami continued to increase following the Mariel Boatlift, indicating that Miami appeared more attractive to non-Cuban immigrants in the years following the Mariel Boatlift. Despite the finding, Card (1990) looks at Miami's high concentration of non-English speakers and youthful industry as the reason that Miami integrated immigrants into the economy without significant consequence. Card (1990) also mentions that the native-Cuban population moved on to better employment options, and thus the negligible impact on native worker wages.

The simultaneous growth in the labor supply and the consumption goods market caused by an immigration event may indicate why Card (1990) found evidence to suggest that immigration has a negligible impact on wages. Returning to the previous short run convention: increased immigration will lead to an increase in the demand for consumption goods and the supply of labor in a local economy. On the demand-front, this can be described as an increase in sales-transactions between native-sellers and immigrant-buyers as immigrant-buyers purchase goods for their own consumption. On the supply-front, this is an increase in labor-transactions between native-employers and immigrant-workers as native-employers rent out the labor of immigrant-workers. Since neither party to these transactions is harmed, and at least one party is generally better off, then these transactions are considered Pareto-improving transactions. In other terms: an increase in the immigrant population will generally increase the quantity of Pareto[PH2.1]-improving transactions in a local marketplace, which in turn increases the overall efficiency of the economy.

It would be expected that an increase in Pareto-improving transactions would result in an overall increased employment level as immigrant workers "replace" native workers, and native workers subsequently attain new employment at firms that need to increase production in response to the simultaneous increase in demand. The implication would be that as labor demand increases, so too does the wages, thus negating the previous short term downward pressure on wages from immigrant-workers entering the marketplace.

When analyzing the impact of immigrant movement around the country and the how the labor markets responded, Geroge J. Borjas (2001) found that both immigrants and natives were overall better-off by immigration. Notably, it was indicated that the relative education and skill level of native-workers and immigrant-workers can result in overall growth for both parties. "It turns out that part of this efficiency gain accrues to natives, suggesting that existing estimates of the benefits from immigration may be ignoring a potentially important source of these benefits" (Borjas, 2001). The "efficiency gain" being referred to is the market efficiency from having immigrants in the labor force, as the immigrants work a disproportionately higher number of marginalized jobs, an often-neglected role of maximizing efficiency in local markets. However, Borjas discusses that simple estimations about how much indirect benefits are accrued to native workers are relatively small, estimating about $10 billion per year in the US economy.

Notably, Borjas (2001) and Card (1990) both indicate that the ability for an increase in population to produce a negligible impact on wages is dependent on the overall "fitness" of the native population. Whether this new population shares similar languages and cultures may indicate how well the immigrant population integrates with the native population; while the immigrant population's relative skill levels, reservation wages, or education may indicate if the immigrant population is complementary or substitutive to the native population. When studying immigration's impact on the income of various groups in the United States and Europe, Ira Gang and Francisco Rivera-Batiz (1994) found, "data suggests that, in the United States and Europe, education is complementary with unskilled labor and experienced labor in production" (Gang and Rivera-Batiz, 1994). Gang and Rivera-Batiz (1994) further indicate that the differing education and skill-level of immigrant workers relative to native workers will determine whether the immigrants are substitutes or complements in the local labor market. This supposes that there could be local economies in which there are larger quantities of low-skill native workers that could benefit when receiving immigrant workers who are relatively higher in skill. The opposite could also be observed: where the native workers are relatively higher in skill compared to a relatively low-skilled immigrant population. Both scenarios suppose a situation wherein Pareto-improving transactions could be increased by the increased demand and supply of much needed higher or lower-skill labor, increasing labor and wages for more workers overall.

A problem with the above hypothetical economies is that low-skill immigrants may have less ability to choose their destination location than high-skill immigrants. Borjas (2001) also found that "new immigrants who have particular skills to offer are more likely to reside in those states that happen to offer the highest wages for those skills" indicating that immigrant workers with higher skill may choose their host location more than low-skill immigrant workers. This indicates that the scenario in which high-skill immigrant workers immigrate to a low-skill native-worker economy would be irrational, as the high-skill immigrant workers would be more likely choose urban epicenters where the wage for their skillset would be relatively higher.

Understanding the impacts of immigration on the local labor markets and native wage rates can be extended to assist in understanding how immigration could cause the prices of consumption goods to decrease, rather than increase. Like the native population, immigrants need food, clothing, and other goods for their own personal consumption, which would result in an upward pressure on the price of consumption goods in the short run. However, this short run effect may be temporary because empirical evidence indicates that prices of consumption goods decrease after an immigration event occurs.

After conflict erupted in Syria in 2011, the nation of Turkey experienced a large-scale influx of Syrian refugees. When studying the impact of the forced immigration event, researchers in Turkey observed that the "general level of consumer prices has declined by approximately 2.5% due to immigration. Prices of goods and services have declined in similar magnitudes" (Balkan and Tumen, 2016). This study indicates that the influx of Syrian refugees decreased the cost of labor in informal labor markets and thus decreased the price of basic goods. Notably, the refugees in Turkey were a better fit in informal labor markets, or markets where the labor is not registered with the government. Going hand in hand with Balkan and Tumen (2016), Lach (2007) found that after Israel observed a large influx of immigrants from the former Soviet Union, a "one-percentage-point increase in the ratio of immigrants to natives in a city decreases prices by 0.5 percentage point on average" (Lach 2007). Likewise, Patricia Cortes of the University of Chicago discovered that, "a 10 percent increase in the average city's share of low-skilled immigrants in the labor force decreases the price of immigrant-intensive services such as housekeeping and gardening by 2 percent" (Cortes 2008).

It is worth noting that each study gave one of two proposed theories behind the decrease in prices: either the substitution of immigrant workers results in a cheaper product due to lower labor costs, or the price elasticity of demand among immigrant populations is especially high and firms will lower prices of consumption goods to meet quantity demanded. However, it is uncertain whether goods that are produced in informal markets are sold in formal markets. Informal markets are more prevalent in unregulated and developing economies, and by nature, it is difficult to compare the quality of goods produced to those in formal markets.

### Hypotheses

Given what is known about immigration, the alternative hypotheses about mass-deportations are: (1) mass-deportations will increase wages; and (2) mass-deportations will increase the price of consumption goods.

## Methodology

To assess the impact of emigration on local labor and consumption-goods markets, this study will analyze the impact of a mass deportation event named "Operation Wetback." The objective of Operation Wetback was to use the United States Army in efforts to expel Mexican immigrants from the states of Texas, California, and Illinois. Roughly 1.1 million Mexican immigrants were removed to Mexico under Operation Wetback, however, some sources believe that this figure is overestimated. Many Mexican immigrants left the United States in 1954 and 1955 following the nativist-anger over the Bracero Program, which allowed Mexican workers to enter the United States as agricultural labor in response to labor shortages from 1942-1964. Regardless, the appearance of mass deportations scared many Mexican immigrants into leaving voluntarily. "In Texas, for example, more than 63,000 individuals returned to Mexico of their own volition; U.S. officials detained an additional 42,000 persons in July 1954" (History, Art, & Archives).

Operation Wetback occurred from 1954 to 1955, and mainly impacted the cities of Chicago, Houston, Los Angeles, and San Francisco. To test the above hypotheses in the context of Operation Wetback, this study will utilize a difference-in-difference approach to estimate the impact of deportations on wages and the price of goods. This study will collect relevant income and price data about each city for the period of 1945-1965.

In the difference-in-difference approach, Cincinnati, Ohio, will serve as the control-group for the cities of Chicago, Houston, Los Angeles, and San Francisco to be compared against. Cincinnati has been selected as the control group because the city was not directly identified as a location where a notable number of deportations occurred under Operation Wetback. Since the difference-in-difference approach aims to individually test the treatment groups against the control-group, it is critical to the study to select a control-group that is not heavily impacted by mass deportations under Operation Wetback.

In terms of population and population characteristics, Cincinnati is notably different from the cities that were directly impacted by Operation Wetback. According to the 1950 Census, the ratio of foreign-born persons to native-born persons in Cincinnati was 4.1% in 1950 (total population of 502,010) (U.S. Census Bureau. "Historical Census Statistics on the Foreign-Born Population of the United States: 1850-1990."). This ratio was 14.8% in Chicago (total population of 3,611,580); 13.4% in Los Angeles (total population of 1,965,150); 17.7% in San Francisco (total population of 775,075); and 3.0% in Houston (total population of 594,585). Three of the five cities have a foreign-born to native-born ratio that is greater than 10%, indicating that at least one tenth (nearly one fifth in San Francisco's case) of the population of those cities were foreign-

born persons.

Cincinnati also uniquely shares some similarities with Chicago and Houston, which may offer greater insight into the impact of mass-deportations on cities of varying size and geographical location. For example, Chicago, is the only city in the treatment group that is in the same region as Cincinnati: the Midwest region. Of the other cities in the treatment-group, Houston is in the South-Western region, while Los Angeles and San Francisco are in the Western region. Houston, Los Angeles, and San Francisco are also significantly closer to the Mexican-American border than Chicago or Cincinnati, which may indicate unique effects of deportations on cities based on geographical location. Likewise, Houston appears to have similar population size and foreign-born to native-born ratio as Cincinnati. This would indicate that the city of Cincinnati and the city of Houston may be closer in size and population than the other cities in the treatment group and provide greater insight into the impact of mass deportations on relatively smaller cities than Los Angeles and Chicago; two of the long-time most populous cities in the United States.

Due to data limitations during the 1940s to 1960s, this study will replace wages and the price of consumption goods with the personal income and the consumer price index (CPI) of all goods respectively. The personal income and CPI data will be gathered from the Statistical Abstract of the United States from the years 1945-1965 (U.S. Department of Commerce, "Income payments to individuals, by states and regions"; U.S. Department of Labor, "Consumer price index-all items, and commodity groups, by cities"). CPI data is available for the metropolitan statistical areas (MSA's) that this study is aiming to look at, but personal income data is only available by state. Thus, personal income data from California will replace the cities of Los Angeles and San Francisco, personal income data from Texas will replace the city of Houston, and the city of Chicago and the city of Cincinnati will be replaced with personal income data from the states of Illinois and Ohio respectively.

As such, the proposed hypotheses can be re-written as: (1) mass-deportations will increase personal income in states that are affected by deportations; and (2) mass-deportations will increase the CPI of all goods in city-MSA's that are affected by deportations.

To isolate the effect of deportations on CPI and personal income, the variable $D_t$ will be used as a DUMMY variable to indicate the years when Operation Wetback occurred (1954-1955). This means that $D_t$ will be 0 for all years, except for 1954 and 1955, when deportations were active ($D_t$ = 1). A time trend, *t*, will be used to capture the effects of the time-series data and indicate the impact of time on CPI and personal income.

This study will utilize the following CPI model:

$$P_{i,t} = \beta_0 + \beta_1(Chicago) + \beta_2(Houston) + \beta_3(Los\ \ Angeles)$$
$$+\beta_4(San\ \ Francisco) + \beta_5(D_t) + \beta_6(Chicago \times D_t)$$
$$+\beta_7(Houston \times D_t) + \beta_8(Los\ \ Angeles \times D_t)$$
$$+\beta_9(San\ \ Francisco \times D_t) + t$$

Where $P_{i,t}$ represents consumer price index of each MSA (Cincinnati, Chicago, Houston, Los Angeles, and San Francisco), $i$, over time, $t$. In the model, Chicago, Houston, Los Angeles, and San Francisco are DUMMY-variables indicating a value of 1 when this city-MSA's CPI data is active in the model. $\beta_0$ will estimate the coefficient of CPI in Cincinnati (control group). $\beta_1$, $\beta_2$, $\beta_3$, and $\beta_4$ will estimate the coefficients of CPI in Chicago, Houston, Los Angeles, and San Francisco respectively, that is, in relation to the CPI of Cincinnati. $\beta_5$ will estimate the coefficient of the deportation event, $D_t$. The terms $\beta_6$, $\beta_7$, $\beta_8$, and $\beta_9$ will estimate the coefficient of the interaction terms, $(Chicago \times D_t)$, $(Houston \times D_t)$, $(Los\ \ Angeles \times D_t)$, and $(San\ \ Francisco \times D_t)$, respectively. These interaction terms indicate the isolated effect of Operation Wetback on the CPI of each state relative to the Cincinnati-MSA.

To analyze the impact of deportations on personal income, this study will use the following model:

$$I_{i,t} = \beta_0 + \beta_1(CA) + \beta_2(IL) + \beta_3(TX) + \beta_4(D_t) + \beta_5(CA \times D_t)$$
$$+\beta_6(IL \times D_t) + \beta_7(TX \times D_t) + t$$

Where $I_{i,t}$ represents personal income of each state (Ohio, California [CA], Texas [TX], and Illinois [IL]), $i$, over time, $t$. $\beta_0$ is the coefficient that describes the personal income in the state of Ohio. $\beta_0$, $\beta_2$, and $\beta_3$ estimates the coefficient of personal income in the states of California, Illinois, and Texas respectively, in reference to the control group, Ohio. The variables CA, IL, and TX are DUMMY variables representing a 1 when each state is active in the model. $\beta_4$ will estimate the coefficient of the deportation event DUMMY-variable, $D_t$, or the impact of deportations on personal income. $\beta_5$ will estimate the coefficient of the interaction term, $(CA \times D_t)$, which will isolate the personal income of California for during the deportation event. Likewise, $\beta_6$ will estimate the coefficient of the interaction term, $(IL \times D_t)$, or the isolated personal income of Illinois during the deportation event; and $\beta_7$ will estimate the coefficient of the interaction term, $(TX \times D_t)$, or the isolated personal income of Texas during the deportation event.

The data used in this study is listed in Tables I and II and shown graphically in Figures 1 and 2. Table I and Figure 1 represent the observed CPI for each MSA from 1945-1965 where 1945 is the base year (1945=100). Table II and Figure 2 represent

**Table I. Consumer Price Index by City-MSI (1945 - 1965)**

| Year (t) | Cincinnati | Chicago | Houston | Los Angeles | San Francisco |
|---|---|---|---|---|---|
| 1945 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 |
| 1946 | 117.9 | 119.5 | 119.6 | 115.6 | 118.1 |
| 1947 | 131.5 | 132.9 | 133.0 | 124.2 | 124.4 |
| 1948 | 133.0 | 137.0 | 136.5 | 129.2 | 130.1 |
| 1949 | 129.6 | 135.3 | 136.1 | 123.7 | 126.3 |
| 1950 | 139.1 | 145.5 | 148.6 | 134.2 | 134.8 |
| 1951 | 146.6 | 154.0 | 156.6 | 143.1 | 143.4 |
| 1952 | 147.8 | 154.8 | 157.8 | 144.9 | 146.7 |
| 1953 | 150.5 | 157.2 | 158.6 | 145.5 | 148.4 |
| 1954 | 148.8 | 158.0 | 157.8 | 144.9 | 146.9 |
| 1955 | 150.0 | 160.1 | 157.8 | 146.2 | 147.1 |
| 1956 | 154.3 | 163.4 | 161.8 | 150.1 | 154.3 |
| 1957 | 158.7 | 169.7 | 164.7 | 154.5 | 158.4 |
| 1958 | 159.6 | 164.3 | 164.6 | 153.9 | 154.6 |
| 1959 | 161.4 | 166.9 | 166.3 | 157.0 | 159.3 |
| 1960 | 163.0 | 169.0 | 167.6 | 159.6 | 161.8 |
| 1961 | 162.8 | 167.6 | 169.7 | 160.6 | 163.3 |
| 1962 | 165.0 | 167.4 | 170.7 | 162.8 | 165.3 |
| 1963 | 166.8 | 173.1 | 174.3 | 165.0 | 168.5 |
| 1964 | 168.7 | 173.1 | 175.1 | 167.3 | 169.6 |
| 1965 | 170.1 | 174.9 | 177.2 | 170.8 | 172.8 |

**(1945 CPI = 100)**

**Table II. Personal Income by State (1945 - 1965) in Millions USD**

| Year (t) | Ohio | California | Illinois | Texas |
|---|---|---|---|---|
| 1945 | 8925 | 13124 | 10589 | 6263 |
| 1946 | 9808 | 14879 | 12019 | 6748 |
| 1947 | 11061 | 16121 | 13636 | 8014 |
| 1948 | 12136 | 17099 | 15167 | 8788 |
| 1949 | 11443 | 17005 | 14107 | 9265 |
| 1950 | 12590 | 18642 | 15329 | 9868 |
| 1951 | 14509 | 21306 | 17001 | 11285 |
| 1952 | 15378 | 23146 | 17681 | 11887 |
| 1953 | 16840 | 24856 | 18800 | 12279 |
| 1954 | 17293 | 27026 | 19812 | 13350 |
| 1955 | 18442 | 29488 | 20988 | 14116 |
| 1956 | 19594 | 32501 | 22472 | 15044 |
| 1957 | 20748 | 35131 | 23579 | 16364 |
| 1958 | 20409 | 36692 | 24076 | 17007 |
| 1959 | 21979 | 40783 | 25734 | 18041 |
| 1960 | 22778 | 43448 | 26425 | 18508 |
| 1961 | 23013 | 45586 | 27410 | 19503 |
| 1962 | 24156 | 49187 | 28859 | 20361 |
| 1963 | 25164 | 52317 | 30020 | 21351 |
| 1964 | 26805 | 56264 | 32078 | 23084 |
| 1965 | 28857 | 59476 | 34551 | 24751 |

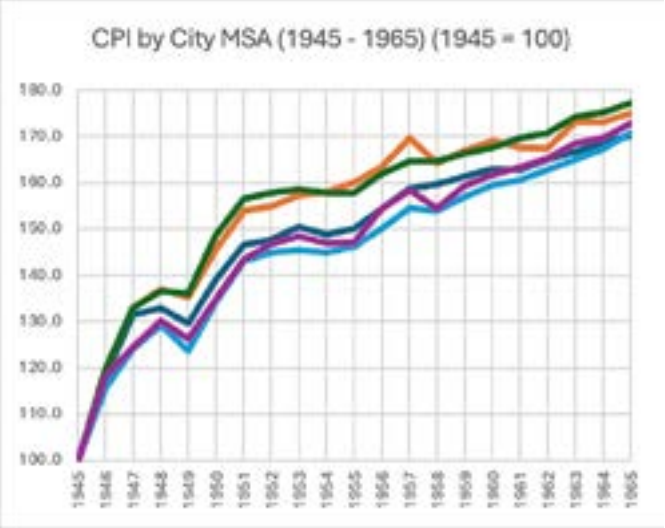


**Figure 1.** Consumer Price Index by City-MSA over the period 1945 - 1965 (1945 = 100): Cincinnati (dark blue), Chicago (orange), Houston (green), Los Angeles (light blue), and San Francisco (purple).

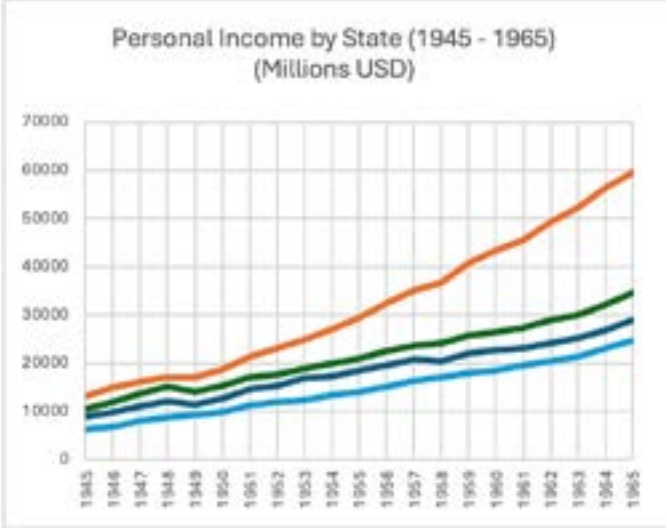


**Figure 2.** Personal Income in Millions USD by state over the period 1945 - 1965: Ohio (dark blue), California (orange), Illinois (green), and Texas (light blue).

the observed personal income for each state from 1945-1965 in millions of dollars USD. In testing both hypotheses, this study will utilize a significant level of 5% (α=0.05) to indicate statistical significance.

## Results

Table III represents the results of the CPI model described in the methodology section with 21 observations of CPI for each MSA identified (total of 105 observations). The model has an Adjusted $R^2$ equal to 0.8568, indicating that 85.68% of the variance in CPI is explained by the model. The F-statistic is $2.623\times10^{-37}$, indicating that the model is statistically significant.

The intercept of the model, $\beta_0$, has an estimated coefficient of 117.2658 (P-value [0.0000] < 0.05), indicating that the baseline CPI of the control group (Cincinnati) is 117.2658 when all other variables are equal to 0. The estimated coefficient for Deportations is 2.2356, but the P-value is equal to 0.6774, indicating deportations is not statistically significant independent variable.

The city of Chicago has an estimated coefficient of 5.2405 (P-value [0.0273] < 0.05), indicating that the CPI in Chicago increased by 5.2405 points relative to the CPI of Cincinnati. In the city of Houston, the estimated coefficient is 5.9059 (P-value [0.0132] < 0.05), indicating that the CPI of Houston increased by 5.9059 relative to CPI of Cincinnati. The cities of Los Angeles and San Francisco have an estimated coefficient of -3.3856 and -1.3791 respectively. However, the estimated coefficients of both Los Angeles (P-value [0.1509] > 0.05) and San Francisco (P-value [0.5567] > 0.05) are not statistically significant.

Each interaction term represents the isolated impact of deportations on the CPI of each affected city relative to the city of Cincinnati. Each city-interaction term has a P-value greater than 0.05, indicating that the isolated impact on CPI in all cities relative to Cincinnati are not statistically significant. The estimated coefficients of the interaction terms for Chicago, Houston, Los Angeles, and San Francisco are 4.4018, 2.4515, -0.4899, and -1.0518 respectively, indicating that the relative impact on CPI that deportations would have had on each city relative to Cincinnati if the variables were statistically significant.

**Table III. Consumer Price Index (1945 = 100)**

| Regression Statistics | |
|---|---|
| Multiple R | 0.933075 |
| $R^2$ | 0.870629 |
| Adjusted $R^2$ | 0.856866 |
| Standard error | 7.205396 |
| Observations | 105 |

| | df | SS | MS | F | Significance F |
|---|---|---|---|---|---|
| Regression | 10 | 32842.842 | 3284.284 | 63.259 | $2.623\times10^{-37}$ |
| Residual | 94 | 4880.267 | 51.918 | | |
| Total | 104 | 37723.109 | | | |

| | Coefficients | Standard Error | t Stat | P-value | Lower 95% | Upper 95% |
|---|---|---|---|---|---|---|
| Intercept | 117.2658 | 2.0931 | 56.0251 | 0.0000 | 113.1099 | 121.4217 |
| Deportation | 2.2356 | 5.3568 | 0.4173 | 0.6774 | -8.4005 | 12.8717 |
| Chicago | 5.2405 | 2.3377 | 2.2417 | 0.0273 | 0.5989 | 9.8821 |
| Houston | 5.9059 | 2.3377 | 2.5263 | 0.0132 | 1.2643 | 10.5475 |
| Los Angeles | -3.3856 | 2.3377 | -1.4482 | 0.1509 | -8.0272 | 1.2561 |
| San Francisco | -1.3791 | 2.3377 | -0.5899 | 0.5567 | -6.0207 | 3.2625 |
| Chicago×$D_t$ | 4.4018 | 7.5751 | 0.5811 | 0.5626 | -10.6388 | 19.4424 |
| Houston×$D_t$ | 2.4515 | 7.5751 | 0.3236 | 0.7469 | -12.5891 | 17.4922 |
| Los Angeles×$D_t$ | -0.4899 | 7.5751 | -0.0647 | 0.9486 | -15.5305 | 14.5508 |
| San Francisco×$D_t$ | -1.0518 | 7.5751 | -0.1388 | 0.8899 | -16.0924 | 13.9889 |
| Time | 2.8486 | 0.1162 | 24.5220 | 0.0000 | 2.6180 | 3.0793 |

**Table IV. Personal Income (Millions USD)**

| Regression Statistics | |
|---|---|
| Multiple R | 0.939318 |
| $R^2$ | 0.882319 |
| Adjusted $R^2$ | 0.869766 |
| Standard error | 3983.210418 |
| Observations | 84 |

| | df | SS | MS | F | Significance F |
|---|---|---|---|---|---|
| Regression | 8 | $8.92\times10^{9}$ | $1.12\times10^{9}$ | 70.290 | $1.00983\times10^{-31}$ |
| Residual | 75 | $1.19\times10^{9}$ | $1.59\times10^{7}$ | | |
| Total | 83 | $1.01\times10^{10}$ | | | |

| | Coefficients | Standard Error | t Stat | P-value | Lower 95% | Upper 95% |
|---|---|---|---|---|---|---|
| Intercept | 3736.0927 | 1210.2840 | 3.0870 | 0.0028 | 1325.0832 | 6147.1021 |
| Deportation | 371.0454 | 2961.3524 | 0.1253 | 0.9006 | -5528.2710 | 6270.3618 |
| California | 14282.6316 | 1292.3241 | 11.0519 | 0.0000 | 11708.1899 | 16857.0732 |
| Illinois | 3333.6842 | 1292.3241 | 2.5796 | 0.0118 | 759.2426 | 5908.1259 |
| Texas | -3567.4737 | 1292.3241 | -2.7605 | 0.0073 | -6141.9153 | -993.0320 |
| California×$D_t$ | -3893.1316 | 4187.6087 | -0.9297 | 0.3555 | -12235.2759 | 4449.0128 |
| Illinois×$D_t$ | -801.1842 | 4187.6087 | -0.1913 | 0.8488 | -9143.3286 | 7540.9602 |
| Texas×$D_t$ | -567.0263 | 4187.6087 | -0.1354 | 0.8927 | -8909.1707 | 7775.1180 |
| Time | 1310.5107 | 71.7982 | 18.2527 | 0.0000 | 1167.4812 | 1453.5401 |

The time variable, *t*, has an estimated coefficient of 2.8486 (P-value [0.0000] < 0.05), indicating that the CPI increases by 2.8486 points over time.

Likewise, Table IV represents the results of the personal income model from the methodology section. The personal income model has an Adjusted $R^2$ equal to 0.8697; indicating that 86.97% of the variance in personal income is explained by the model. The model has 84 observations, or 21 observations for each state in the model. The significant F-statistic of the model is $1.00983\times10^{-31}$. This indicates that the model is a good fit.

The intercept term, which indicates the baseline personal income of the state of Ohio, is 3,736.0927 (P-value [0.0028] < 0.05). The deportation variables estimated coefficient of 371.0454 (P-value [0.9006] > 0.05) is not statistically significant, indicating that the deportation event didn't significantly impact personal income in each state.

The coefficients of the isolated personal income of California, Illinois, and Texas relative to the state of Ohio are 14,282.6316 (P-value = 0.0000), 3,333.6842 (P-value = 0.0118), and -3,567.4737 (P-value = 0.0073) respectively. These coefficients estimate the baseline personal income in each state relative to the state of Ohio. The P-value of each state is less than 0.05, indicating each variable as statistically significant.

However, the interaction terms of each state, which represent the isolated impact of deportations on each state's personal income relative to the state of Ohio, are not statistically significant. [cw1.1][cw1.2]The interaction term for California has a coefficient of -3,893.1316 (P-value = 0.3555), the interaction term for Illinois has a coefficient of -801.1842 (P-value = 0.8488), and the interaction term for Texas has a coefficient of -567.0263 (P-value = 0.8927).

The time trend, *t*, has an estimated coefficient of 1,310.5107 (P-value [0.0000] < 0.05), indicating that with each time observation, personal income increased by 1,310.5107 million dollars.

## Discussion and Conclusions

Upon the completion of this study's analysis, the remaining procedure is to determine what the empirical results in the analysis section indicate about the hypotheses made earlier. Recall the following hypotheses: (1) mass-deportations will increase personal income in states that are affected by deportations; and (2) mass-deportations will increase the CPI of all goods in city-MSA's that are affected by deportations.

This study tested two difference-in-difference models. The first model estimated the impact of deportations on CPI for the City-MSA's of Chicago, Houston, Los Angeles, and San

Francisco relative to the control-group, Cincinnati. The second model estimated the impact of deportations on the personal income for the states of Illinois, Texas, and California relative to the control-group, Ohio.

The results from the performance of the CPI model indicate that Operation Wetback did not have an effect on the CPI. The Adjusted $R^2$ (0.8568) of the model indicates that the model explains 85.68% of the variance in CPI. The F-statistic ($2.623\times10^{-37}$) indicates that the model is a good fit overall. In the CPI model, the estimated coefficient of the intercept (117.2658) indicates the baseline CPI in Cincinnati. The estimated coefficient for deportations is 2.2356 but is not statistically significant because the variable's p-value equals 0.6774. The baseline CPIs of Chicago and Houston increase relative to Cincinnati by 5.2405 and 5.9059 respectively. None of the interaction terms in the CPI model are statistically significant, which indicates that the isolated effects of Operation Wetback do not significantly impact the CPI of each city-MSA relative to Cincinnati. The time trend has a coefficient of 2.8486, indicating that CPI increases by 2.8486 points with each time unit.

Regarding personal income, the results of the analysis indicate that Operation Wetback did not have an effect on personal income. The Adjusted $R^2$ (0.8697) of the model indicates that the model explains 86.97% of the variance in personal income. The F-statistic ($1.009\times10^{-31}$) indicates that the model is a good fit overall. The intercept coefficient of the model is estimated to be 3,736.0927, which indicates that the baseline personal income in Ohio is $3,736.0927 million dollars. The coefficient for the deportation variable is 371.0454 but is not statistically significant (P-value = 0.9006). Therefore, deportations are not significantly correlated with an increase in personal income. For the states of California, Illinois, and Texas, the estimated baseline personal income coefficients relative to Ohio are 14,282.6316, 3,333.6842, and -3,567.4737 respectively. Each state has a baseline personal income coefficient that is significant, indicating how each state's personal income changes relative to Ohio irrespective of deportations. For each interaction term, none of the states are statistically significant, indicating that the impact of deportations on each state did not significantly impact personal income relative to Ohio. The time trend has a coefficient of 1,310.5107, indicating that the personal income increased by 1,310.5107 million dollars with each additional unit of time. Overall, the results of both models indicate that mass-deportations had little to no effect on CPI and little to no effect on personal income. Therefore, this study rejects both hypotheses.

A true comparison of this study's results to the literature is difficult, as this study is fundamentally about emigration while the literature is fundamentally about immigration. Regardless, Card (1990) indicated that wages were not impacted by the Mariel Boatlift, and the results of this study indicate that personal income was not impacted by Operation Wetback. However, this study found that the CPI of all goods does not appear to be impacted by the deportations under Operation Wetback. This is different than what was indicated by Lach (2007), Cortes (2008), and Balkan & Tumen (2016), which indicated that prices would decrease with immigration.

So, what happened? Certain indicators in the models suggest that the true effects of Operation Wetback are overshadowed by the general population growth of all MSA's and states at the same time as the period analyzed in this study. Consider each model's results. Each model appears to indicate strong fitness to explain the variation in CPI and personal income. Both models have a high Adjusted $R^2$, and a low F-statistic, indicating strong correlation between the explanatory variables and the dependent variable. Within each model the deportation variable and each interaction-term variables are not statistically significant, indicating that deportations had no effect on the CPI and personal income of each city relative to the control-group. Both models have a time trend with a statistically significant positive correlation with CPI or personal income. Therefore, time appears to increase CPI and personal income more than deportations under Operation Wetback.

In the historical context of the studied period, the year 1945 marked the end of WW2. Hundreds of thousands of men returned to the United States from the European and the Pacific Theaters, marking the beginning of the infamous "baby-boom"-generation (estimated 1946 to mid-1960s).

**Table V. Population by State (thousands of persons)**

| Year | Texas | Illinois | Ohio | California |
|---|---|---|---|---|
| 1945 | 6,826 | 7,601 | 6,916 | 9,344 |
| 1965 | 10,378 | 10,693 | 10,201 | 18,585 |

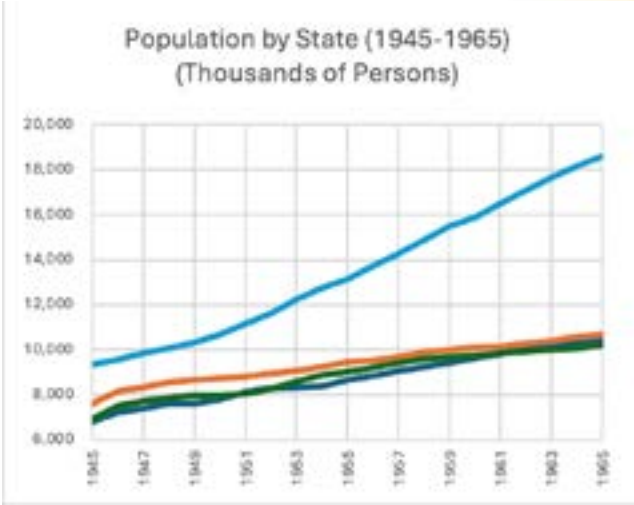


**Figure 3.** Resident population (in thousands of persons) over the period 1945 - 1965 by state: Texas (dark blue), Illinois (orange), Ohio (green), and California (light blue).

Table V and Figure 3 represent the resident population of each state (in thousands of persons) in 1945 and 1965 (U.S. Census Bureau, Resident Population in Ohio [OHPOP]; U.S. Census Bureau, Resident Population in Illinois [ILPOP]; U.S. Census Bureau, Resident Population in Texas [TXPOP]; U.S. Census Bureau, Resident Population in California [CAPOP]).

As indicated in Table V, the population of Texas grew from 6.826 million people to 10.378 million people (change of +3.552 million people), the population of Illinois grew from 7.601 million people to 10.693 million people (change of +3.092 million people), the population of Ohio grew from 6.916 million people to 10.201 million people (change of +3.285 million people), and the population of California grew from 9.344 million people to a whopping 18.585 million people (change of +9.241 million people). The population of California alone increased by 98.9% from 1945-1965. Overall, the population of Ohio, Illinois, Texas, and California increased by 19.17 million people from 1945-1965. This implies that the change in population during the baby-boom generation negates or otherwise hampers the impacts of "Operation Wetback" in each state studied.

In summation, this study has sufficient evidence to suggest that deportations under Operation Wetback did not have a significant impact on CPI and personal income relative to the control-group. However, it is plausible that the timing of Operation Wetback coincides with factors that otherwise negate or diminish the impacts of the deportation event.

A potential area of further study could be exploring emigration events that are not related to mass-deportations. An example could be the population decline of Detroit from the 1960s to the mid-2010s. During this period, the population of Detroit declined by an estimated 900,000 people. Most of the population that migrated left Detroit (residing in Wayne County) for the suburbs in the neighboring Oakland and Macomb counties. Exploring this emigration event may indicate how migration can impact an economy without a mass-deportation policy in effect. However, future studies should account for the characteristics of migrants, because migrants leaving Detroit to the neighboring counties during the period were predominately higher-skill or higher-pay unionized automotive workers.

Areas to expand this study in future research may be the use of deportation values, or how many people were deported during the period. This would identify if there were potential "per deportation" effects on CPI or personal income. Likewise, the inclusion of more state-level personal income data or more MSA-level CPI data would result in a more comprehensive analysis of how deportations impact the United States as a whole.

Other further research could be a future analysis of the current administration's deportation policy and its impact. At the time of writing, there are articles in the news indicating that immigration into the US has been reduced for both authorized and unauthorized immigrants. Preliminary reports about current events indicate that the federal government is not necessarily deporting unauthorized immigrants at higher volumes but is operating in a manner that is meant to intimidate or alienate immigrants into leaving this country out of their own accord. This appears similar to the strategy behind Operation Wetback, wherein it is estimated that more people left on their own rather than be deported. It would be interesting to perform a future analysis on this period and compare the results to this study, especially because there is more comprehensible and accurate data reporting now relative to the 1950s.

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# American Spirit and the Polar Dream

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*History*

**KEYWORDS:**
American spirit, polar exploration, Arctic, Antarctic, individuality, competition, idealism

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Ava Ryan is a Senior student graduating in May of 2026 from Northern Kentucky University with a Bachelor's in History and a minor in Anthropology. She presented at NKU's Spring Celebration 2024 and was included in the President's Honor List for the Fall 2024, Fall 2025, and Spring 2025 semesters. She is grateful for the support of NKU'S History Department, and the continued guidance of her faculty mentor, Dr. Andrea Sutherland. She plans to pursue her Master's degree in Public History at Northern Kentucky University following her graduation.

## Abstract

Polar exploration is often perceived as a solely European endeavor, but American involvement tells a different story. This investigation examines American participation in polar exploration to highlight three core tenets of the "American Spirit": individuality, competition, and idealism. By examining the Americans involved in the global saga of polar exploration, we can see how their identity as Americans distinguishes their exploits from their European counterparts. Additionally, this exploration reveals how a nation's spirit can shape and be shaped by its people, contributing to a unique national identity.

## Introduction

The abandoned *HMS Resolute* was found alone in the Arctic ice in 1855 by an American whaling vessel, the *George Henry*, and returned to a grateful England as a show of goodwill. When in 1879 the *Resolute* was decommissioned, Queen Victoria sent one of three desks built with the deconstructed wood to then-president Rutherford B. Hayes. The "Resolute Desk" was placed in the White House's Oval Office and services an American president to this very day.[1] This part of the desk's origin story is no great mystery to the American public, though the reason for the *Resolute's* imprisonment in the ice is rarely expounded upon. She was one of many ships that departed in search of Sir John Franklin's lost 1845 expedition for the Northwest Passage once it had become clear that Franklin and his men would not be returning to England without assistance, victorious in their quest or otherwise.[2] The search for the mythical Passage, then, intertwines with the history of the United States of America down to seemingly innocuous details—from the desk of the president crafted from an Arctic vessel to the Hudson River, named after a Canadian explorer seeking the Passage in America. America is often excluded from recountings of polar exploits, as if the involvement of the U.S. is so inconsequential as to be unworthy of mention. It is worthwhile to posit, however, that American involvement in polar exploration as compared to other theatres of polar conquest worldwide is emblematic of the core tenets of the American Spirit: individuality, competition, and idealism.

What eventually became a worldwide race for the Passage began as a primarily European affair. The "Old Guard" of British explorers like John Ross, John Barrow, William Edward Parry, and John Franklin all experienced their fair share of hardship at the hands of the sea, the ice, and scurvy, though none would acquire such infamy as Franklin and his lost expedition.[3] These were the early days of the golden age of polar conquest, beginning just after the Napoleonic Wars and the War of 1812 had come to a close. The rumblings of polar exploration touched even these seemingly disparate events; John Franklin fought at Trafalgar in 1805 and New Orleans in 1815, and the *HMS Terror*, which he later commanded as an ice-breaking vessel in 1845, participated in the 1814 assault on Fort McHenry and inspired Francis Scott Key to pen "The Star-Spangled Banner."[4] American involvement at this time was not, however, exclusively tangential. Thomas Jefferson selected Meriwether Lewis and William Clark to lead an expedition into the newly acquired Louisiana Purchase of 1803, to explore the untamed land and, hopefully, to find a Northwest Passage via the Missouri River. They did not find the Passage, though they made strong headway into uncharted areas that were now officially parts of America, and proved that overland travel in the continental United States to the Pacific Ocean was possible.[5]

An American whaler discovered the *HMS Resolute*, but America had more stake in the search for Sir John Franklin and his men than merely picking up after other nation's failed efforts. Two of the most well-known polar explorers who combed the Arctic for news of Franklin's fate were Americans Charles Francis Hall (born in 1821) and Frederick Schwatka (born in 1849).[6] Hall was a contemporary to the expedition, searching for evidence of their whereabouts within years of Franklin's disappearance, while Schwatka would perform much of his search between 1878 and 1880, long after the expedition set sail.[7] Even though it had been decades since Franklin and his men were last seen alive, global interest in their fate had hardly waned. Both men were born and raised in the United States, yet chose to explore the vicious Arctic in search of England's lost expedition, and made historic discoveries in the process. Schwatka was considerably more successful than Hall in discovering tangible relics of the expedition they both sought, though the greatest accomplishment shared by these explorers was proof of white Western men surviving in the Arctic for greater periods of time and with greater comfort when adopting the habits of survival employed by the local Inuit people of the Canadian Arctic. The indigenous people of the region had suffered from a poor relationship with European interlopers for many years, and when the Scottish Dr. John Rae returned to England in 1854 after his own excursion to King William Island with the grim tidings of cannibalism among Franklin's men, the Western opinion of the Inuit soured even further.[8] Hall and Schwatka's adoption of Inuit techniques, then, was somewhat radical. The superiority of these technologies, like dogsledding, was noted by famed Irish explorer Leopold McClintock, also known as the "father of modern sledging." Even though the dogsled was noticeably swifter than the typical heavy man-hauled sledge (a small boat set upon runners attached to harnesses), McClintock continued to insist upon cumbersome traditional sledges on later expeditions, which indicates the negative European attitudes towards adoption of non-Western technologies.[9] The Americans involved in this conflict approached with a mind that, while perhaps not truly *open*, was certainly not as rigidly closed off as their European brethren. It is important to note here that this seemingly progressive phenomenon does not indicate the typical American treatment of indigenous people, which has been consistently deplorable since the discovery of the North American continent by Europeans.

The Franklin Expedition was England's claim to polar infamy and by far the most well-known, but America had her own fair share of Arctic misfortune. The taint of supposed cannibalism colors not only Franklin's crew but the crew of American captain Adolphus Greely, who was one of only seven survivors out of a crew of twenty-five from the 1881 Greely Expedition—also known as the Lady Franklin Bay Expedition—though all survivors denied the accusation of cannibalism and maintained this position fiercely.[10] The reason for Greely's departure is not dissimilar to many of the expeditions taking place at this

point, including the also ill-fated American venture of the *USS Jeannette*.[11] What was most valuable at this time was not any material gain—hopes of a profitable Northwest Passage had sunk, for the most part, with John Franklin—but rather scientific knowledge and data collecting. There was also the search for the magnetic poles, though that quest increased in ferocity during the 20th century. A contemporary article published in the *Scientific American* on the departure of the *Jeannette* stated: "The grand object of the expedition is to add to our knowledge of the unexplored regions in the neighborhood of the North Pole—if possible to attain to that long sought and apparently unapproachable geographical position."[12] There seems to be a great American discomfort concerning the "great blank which covers our maps…," which rings true when considering the drives of Manifest Destiny and similar forces upon the collective American psyche.[13]

## Individuality

Other nations financed their polar ventures differently than the typical American expedition, which can be indicative of national values and attitude towards exploration. The English Admiralty was tasked with financing and managing exploratory expeditions. For American nonmilitary operations, many captains seeking a ship, crew, or financier had to source their own funding and assistance as an individual; one such financier was the American philanthropist Henry Grinnell, who fully funded the first American effort to find the Franklin Expedition in 1850.[14] Divisions like the U.S. Antarctic Program (USAP), which is run by the U.S. National Science Program, would not be formed for years after the Heroic Age of Antarctic Exploration (ending in 1922). USAP was formed in 1959, marking one of the clearest divides between private and governmentally funded exploration in America.[15] This is not a firm rule; famed Norwegian explorer Roald Amundsen was funded by through private financiers as well as funds raised on the lecture circuit often worked by explorers, and he often borrowed his fellow explorer and friend Fridtjof Nansen's ship the *Fram* when money was an obstacle, though he is one of the more notable outliers.[16] For example, the Belgian Antarctic Expedition (more commonly known as the *Belgica*, for the ship used), on which Amundsen was a crewmember early in his career, was funded by the Royal Belgian Geographical Society and approved by the royal family of Belgium.[17] Two of the most captivating American figures in the polar sphere, Robert E. Peary and Frederick Cook, were funded by multiple independent associations and casino moguls, respectively.[18]

Peary, who claimed to be the first man at the North Pole, was often lambasted by the press and public after his return from his 1908 expedition for his choice in travelling companion. On his final push to the "Pole," he chose his longtime colleague and friend Matthew Henson, a Black American sailor with an extensive history at sea and in the Arctic, and who was described by other expedition members as being extremely capable and handy.[19] Henson was Peary's only American witness to his supposed polar feat (the others being four Inuit men, who hardly registered in the American mind). This was not the only reason for the doubt surrounding Peary's achievement, but it was one of the most salacious and opined upon. Why, the skeptics asked, would Peary not bring along one of the white men who accompanied him on the expedition, who would be deemed more trustworthy by the public and government alike? Did he command Henson to lie for him, or to falsify measurements?[20] Peary himself wavered on the subject, professing at first in his 1910 book that he only took Henson along with him because he was afraid that, if left alone back at the camp, Henson would die due to his own weakness and incompetence.[21] This was both outlandish and, naturally, attributed to his race. Peary changed tactics very quickly in 1911 when called before a congressional investigation committee, charged with proving the legitimacy of his claim on the Pole. He then stated, in the interest of proving his witness reliable, that, "The man I took with me was more effective for the combined demands of extended work than any white man I have ever had with me."[22]

There have been a number of explanations put forward as to Peary's reasoning for choosing Matthew Henson as his second for his final polar expedition. The first and most obvious being that Peary and Henson had a longstanding professional relationship and friendship, and that Henson had proven himself more than capable, further disproving Peary's slander of him in his book. Henson saved Peary's life on more than one occasion, and Peary is quoted as having said of him, "[Henson] is my most valuable companion. I could not get along without him."[23] Another proposed explanation is that Peary was intent on having only Americans at the Pole (Inuit guides notwithstanding.) The probable second choice for Peary's right hand on the expedition was a white man by the name of Bartlett, who was often put forward in the time following Peary's return as the man he should have chosen over Henson. Peary, however, was intensely patriotic, and Bartlett was Canadian.[24] For Peary, perhaps patriotism eclipsed racial prejudice in this instance.

The final explanation, and the one most aligned with the tenet of individuality, is that Peary believed in some sense that—were he to bring Henson—he would not have to share any of the honors for his feat.[25] This is because, for all intents and purposes, Henson would not count as his own individual. In the white American mind, Peary was Henson's natural superior, a man with his own individuality, who commanded Henson's labor as a tool. Henson would not be his collaborator, or a co-discoverer. There would be no "Peary and Henson at the Pole," the achievement would be Peary's and Peary's alone. Henson wouldn't, essentially, "count." Peary could benefit from his expertise and make use of Henson's skillset, while maintaining his image as the sole discoverer of the Pole, the figure worthy of all of the accolades associated with such an achievement,

the summiteer of one of the last great masculine individual trials left unconquered. The American idea of the individual is therefore extremely important, but not all individualism is made equal. Robert E. Peary, on account of his race, is allotted more agency and individuality than Matthew Henson, who was by all accounts more capable and well-rounded than Peary. Henson, to accrue his own due portion of the acclaim given to Peary, had to first prove the irrelevancy of his "racial inheritance" in order to be thought of as an individual.[26]

The American focus on individuality indicates the importance of personal glory as compared to the goals of shared victory in other countries. The American view of glory is that of bringing victory home through your own personal exploits, whereas elsewhere there is greater collaboration between members of formal institutions in the hopes of association with someone who has or might one day accrue fame, glory, or victory. It is also a decidedly masculine pursuit, the attainment of the pole would be "…the ultimate test of manhood."[27] The American man has no sense of diluted or shared victory; it is all or nothing, even as it relates to matters of international interest. This factor also heightens the perceived accomplishments performed by Americans in the eyes of their fellow countrymen—if a feat achieved by a singular figure is wildly impressive, such as being the first man to navigate the Northwest Passage, or to step foot on a magnetic pole of the Earth, and Americans view accomplishment as the outcome of an individual's effort and not the sum of all other combined efforts that it took to get them there, how much more elevated would that make the accomplished American explorer in the public opinion? This also has an unfortunate inverse; just as Americans are willing to ascribe all individual victory to the singular summiting figure, they are equally willing to lay blame on the failed individual.[28] A competition between two parties will inevitably, at least in the American worldview, result in the existence of a "winner" and a "loser." These two labels are not necessarily set in stone, and the popular consensus on who "won" in a competition between individuals can be subject to change, but the one-time loser will have an extremely difficult time of clawing their way back into the good graces of the American people. Winning is an individual moral victory, which implies the inverse to be true as well. Losing is an individual moral failure. There is no way for the American who has "lost" to effectively pass on this ire to another party; for better or for worse, the American's deeds are ascribed entirely to them and them alone. In the case of the scramble for the North Pole, this would result in two unsalvageable reputations, and an intense period of infighting between two of America's most famous (or infamous, depending on who is asked) polar explorers.

## Competition

The American focus on acclaim won through competition is best exemplified in the great Polar Controversy of the early 20th century; a battle fought on the ice and at home between explorers Frederick Cook and Robert E. Peary. Both men were vying to be the first to set foot on the North Pole, and both claimed to be victorious. What ensued were two rivalling smear campaigns that eclipsed what Cook calls the "Polar achievement" entirely, instead shifting focus onto the newspapers that took sides and defended their candidate *ad infinitum*.[29] When Cook published an account of his expedition, he took every opportunity to malign Peary as a jealous, untrustworthy miser, who could not stand to see Cook overtake him in their rivalry.[30] Peary, when told of Cook's rival claim, stated in a telegram sent to the New York Herald: "Cook has simply handed the public [a] gold brick. He's not been at the pole April 21, 1908, or any other time."[31] Cook himself had much to say on the topic of Peary's character in his account, writing: "To destroy the advantage of priority of my conquest, and to establish himself as the first and only one who had reached the Pole, was now the one predominant effort to which Mr. Peary and his coterie of conspirators set themselves. To this end the cables were now made to burn with an abusive campaign…"[32] Even though the public was immediately swayed by Cook's smooth persona and swagger, the government favored Peary and presented him with a promotion to rear admiral for his exploits at the supposed pole. Peary filled the much-needed role of national hero for the still-young American nation. It is logical for America, a country so focused on aggressive growth and expansion, to have a need for a heroic explorer archetype. After Americans such as Lewis and Clark had successfully established themselves within their own country, they needed to prove themselves to the rest of the world as a key player in the games of national expansionism.[33] Robert E. Peary was this national hero for a while, though in retrospect many researchers hold that neither man ever truly reached the pole. Peary's diary was originally held back by his family from the public for fear of misuse or the twisting of words by the press who had previously slandered him, but was finally released, examined, and found to hold marginally more water than Cook's own account. On page 83 of his journal, he writes, "The Pole at last!!!"[34] The Polar Controversy was an irreparably ugly affair and tainted the reputations of both men, though Cook attracted the worst of it in retrospect, and his career never recovered. Cook, establishing somewhat of a decided penchant for running cons, was imprisoned for mail fraud concerning a Texan oil rig investment scheme later in life and would remain incarcerated until 1930. With his reputation as an explorer in tatters, he turned to scams and grifting to make a living.[35] Americans, as seen in Cook's case, are not prone to forgiveness after a slight.

On the other side of the world, there was a race happening for the South Pole near-concurrent with the height of the Polar Controversy. This, differently from the Cook-Peary conflict, was a competition between separate countries as well as individual men. Even though one might assume that—in dealing with intra-national issues on top of interpersonal conflict—the

viciousness between opponents would be enhanced, this was not the case. The Norwegian Roald Amundsen and the Englishman Robert Falcon Scott's competition for the Pole seems to inhabit an entirely different realm than Cook and Peary's verbal brawl. Amundsen eventually took the South Pole, while Scott and a small party of his men perished in the pursuit. Nowhere in this odyssey were the hallmarks of the Cook and Peary debacle seen; Amundsen did not flaunt his victory by speaking ill of his fellow explorer, even offering him supplies when they both were on the trail and in direct competition to one another. Scott did not slander Amundsen in his private journal, and his last recorded words were concerned with his own men and no other petty earthly grievances.[36] He is described favorably by those who knew him; crewmember on the Terra Nova Expedition Apsley Cherry-Garrard chief among them in his own published account of the ordeal. Even stranger is the fact that Roald Amundsen and the infamous Frederick Cook were very good friends. They both served on the *Belgica* during her trials in Antarctica and formed a fast bond through the miseries of the long polar night, scurvy, treacherous ice flows, and cowardly commanders.[37] These men appear to be opposites, but both were driven, ambitious, and creative. These qualities are what drew them to each other early in their respective careers, and these qualities are what propelled each man into his own sphere of fame. The difference, then, does not lie in base characteristics. It must be noted that one man is American, and the other is not. There are also the interesting implications of one of the largest and ugliest controversies in polar exploration history happening between two Americans, when America was anything but the dominant power in that realm. There must be something unique to America, then, that causes such volatility in her children. This can be and has been called many things, but here will be described as the American Spirit.

## Idealism

Americans are volatile, as discussed above. Americans are also idealists, and dreamers, and revolutionaries. It is not possible to dream when centered fully in reality, and this is where the American attachment to fiction manifests. Fiction is important to American idealism in the way that blood is important to the body. The U.S. has a relatively small pool of domestic folklore and folk heroes compared to other, older nations, which seemingly might discourage the religious attachment Americans have to the realm of stories. America is a young country, descended from old powers with established lore. The earliest Americans did not abandon these stories when they left their place of power; rather they clung to the tales of their motherland as a grounding force. The localized tales of King Arthur and the Loch Ness monster were not abandoned by the Pilgrims and Puritans in their flight to America; they were grandfathered into the newer stories being generated inside of the fledgling colonies. When America severed official political ties to its European masters, the newly independent Americans still circulated these stories. Post-American Independence, the European interest in American folklore never rose, while American attachment to European fiction never waned. These stories remain important to the American mythos in ways that the new American stories will never become important to, say, the Russian or Welsh mythos. The fiction created *within* America seemingly has an even greater power; the phrase "my white whale" spawns from American author Herman Melville's 1851 novel Moby Dick and is commonly understood to mean something sought but virtually unattainable. Even if the person on the receiving end of this phrase has never read the novel, they more than likely will know what the idiom means, such influence did this work have. Melville himself seemed uncomfortably aware of his own power as the vessel through which a story passes—after the publication of *Moby Dick*, he became afraid that "Art [was] powerful enough to raise monsters from the deep."[38] On the subject of polar exploration, the American author Walt Whitman penned his 1871 poem "A Passage to India" on the mythologization of the quest for the Northwest Passage. He writes, "O you fables spurning the known, eluding the hold of the known, mounting to heaven!/... A worship new I sing/ You captains, voyagers, explorers, yours/…You, not for trade or transportation only/ But in God's name, and for thy sake O soul."[39] Here the religious fervor for the explorer is on full display. The quest is not outlined in material or practical terms, but rather as a spiritual undertaking worthy of worship. The myth of the explorer is America's favorite fiction, the crusade for knowledge like the crusade for God, and the unknown the worst thing imaginable. Refer again to the coverage of the departure of the USS Jeanette, and the national discomfort with the "great blank which covers our maps…"[40] Whitman above speaks of *worshipping* captains, voyagers, and explorers.[41] This religiosity, the appeal to a higher purpose, is a microcosm of the American Spirit's focus on idealism as a core tenet of American identity.

The most consequential example of this relationship with fiction in the realm of polar exploration stems not from an American author, but from the French novelist Jules Verne. Verne's works often focused on the sea, the dangers posed by the vastness of the ocean, and his own awe of the water and its mysteries. His works did very well in America; tangentially, the first submarine to pass under the North Pole was named the *USS Nautilus* after the *Nautilus* in Verne's T*wenty Thousand Leagues Under the Sea*. Verne was admired for his ability to tell a compelling story, though this seems to have been the end of his tangible impact on the landscape of polar exploration. That was until 2003, when the Canadian environmental physicist and Arctic historian Randall Osczevski proposed a seemingly outlandish theory: Frederick Cook had fabricated his account of the attainment of the Pole based off of Verne's works.[42] In the history of examining polar exploration, this was a new avenue previously unexplored. Cook's wild claims of seeing ice islands break away from the mainland and drift on the Arctic

currents are implausible and unfounded, though of course Verne wrote a novel about one such island when Cook was a child. Osczevski posits that the somewhat unusual route that Cook took to the "Pole" could in part be a sightseeing mission; Cook was touring his favorite locations described by Verne to see how they compared, even if this did not make sense for pursuing his stated goal of attaining the Pole. This would make sense if, as many modern researchers believe, Cook knew that he had not actually reached the Pole, and had either a nonexistent or middling at-best intention of making a genuine attempt. His self-reported route has been described in the years after his expedition as nonsensical, and this may explain why he went about it in the way that he did.[43]

Cook lost his father and was born into poverty, and therefore Osczevski asserts that he could have found missing role models in the protagonists of Verne's works. The similarities between Verne's characters and Cook's life are uncanny: Dr. Clawbonny of *The English at the North Pole* was a smooth talker, fast at making friends, a doctor who "practiced little," and grew malcontented with his commander's seeming ineffectiveness.[44] This parallels Cook's time on the *Belgica*, when he struggled to convince commandant Adrien de Gerlache of raw penguin meat's antiscorbutic properties and chafed at de Gerlache placing his standing with Belgium above his own men's wellbeing. Osczevski also points out that while on the *Belgica*, Cook used an ingenious and unprecedented technique to shield the ship from ice floes previously described in a Verne novel.[45] It is unproven whether or not Cook ever actually read any of Verne's works, though the fact that the theory has been posed at all is perhaps indicative of the intense American relationship to fiction. The fantastical descriptions provided by Cook are reminiscent and as compelling as those of speculative fiction, and the American public of the time could not get enough. Other European explorer's accounts of the Arctic were often seen as dry, but never Cook's. The American public latched onto Cook like they had latched onto King Arthur and Robin Hood, and experts in the fields that Cook exploited were willing to back him up because he exhibited charisma, persuasive writing skills, and the knowledge of how to simply tell a good story. Melville's fears of the fictional bleeding into the real, then, are not as odd as they appear on a first glance. This appeal to the power of fiction is the American tenet of idealism made manifest, but only one facet of the proverbial American Spirit.

America in the golden age of polar exploration was a loud, young country. She had burst onto the scene with cannon fire and declarations and demanded that she be known for what she was, even if she was new compared to these old powers. This is a mindset passed down to her constituents; the greatest known and most spectacular struggle in the entire history of polar exploration was between two Americans who exemplified these values to the maximum. Prior to the Polar Controversy, America had not established a good or even particularly notable track record in the polar sphere. Operations like the Greely and *Jeannette* expeditions were disasters, but not quite so salacious as Franklin's doomed expedition. An American whaler discovered the *HMS Resolute*, but not as part of an epic decades-long quest like some other European vessels embarked upon. The Polar Controversy, then, was something new. Other polar dramas were insular to an organization or select group of people. When the British naval officer John Ross mistakenly sighted a cloud masquerading as a mountain and named it for one of his chief donors in 1818, turning back from what might have been a profitable voyage for fear of this illusory obstacle, he was embarrassed, certainly, but not ruined to the point of irrelevance. He did not go on another Arctic voyage after the incident but was never shy about instructing the younger explorers employed by the Admiralty in the proper way of doing things. He did not fade into obscurity or irrelevance, due to his connections to insular groups such as the Admiralty.[46] When Frederick Cook and Robert Peary took to the papers and publishing presses to declare their own respective victories, though, the public took sides and vehemently maligned the opposing faction. This tribal nature is engineered in America, where one man may claim individual glory but collective victory is near to meaningless, when a personal victory was possible. Americans love a celebrity. The American polar explorer Richard E. Byrd—who operated in the mid-twentieth century after the race for the North Pole—knew how to exploit the media to sensationalize his own story, rather than Cook and Peary's desperate attempts to appeal to the fickle mob of public opinion. Byrd cultivated his own image consciously; he is a progenitor of what one might call a celebrity or even an influencer in the twenty-first century.[47] He understood how to promote a public image separate from the messy details of personal life, and he understood what exaggerated face his audience needed to see to admire and love him. His lurid claims about what he witnessed in Antarctica, including extremely flowery and vague prose which has been misinterpreted in years since as support for a flat earth, were marketed so excellently that they are still in circulation today.*48* His experiences are separate from Cook's and Peary's, though all three showcase facets of the American Spirit.

## Conclusion

The goals of a society will reliably reflect its station and values, being an idealized projection of the trajectory of said civilization. Where a society wants to be is a very good indicator of what it believes in, or holds dear. In the case of American polar exploration, one of the greatest values on display is the worthiness of competition. America is a country of dreamers, but Americans are in conflict over who may achieve those dreams first.[49] One of the earliest, most sacred American values is that of Manifest Destiny—the idea that expansion and exploration by Americans is predetermined and inevitable.[50] This provided Western settlers with motivation and opportunity, while simultaneously irreparably harming

indigenous populations of flora, fauna, and cultures which are now lost forever.[51] The explorer is a symbol of hope for America; the country's own namesake is Italian explorer Amerigo Vespucci, and the likes of Lewis and Clark are elevated to folk hero status even while the harmful aspects of their interactions with land that was not unoccupied or unclaimed at the time of "discovery" are discounted and played down in the popular mind. Christopher Columbus has a national holiday on the American calendar, when he is now widely believed to be anything but a role model. Monuments to the earliest colonists in the North American continent are regarded with near-religiosity; Plymouth Rock, Jamestown, and Roanoke are spoken about with biblical fervor. The inaccurate fable of the "First Thanksgiving" is taught in elementary schools and only briefly corrected if at all in higher education, and still the myths purported about early expansion and relations with indigenous populations are widespread and often purposefully serving an outside agenda. The cause of the explorer is the cause of the righteously white and masculine, the cause of the American is then the cause of the righteous, and the cause of the explorer is the cause of the American.[52] When it comes to goals that have no true material value, such as the magnetic North or South Poles, the pipe-dream Northwest Passage, or the quest for the Open Polar Sea, the motivation of discovery is for nothing but national pride and self-determination. Americans may Manifest Destiny in any sea, any field, and any continent. Whitman writes: "Lo, soul, seest thou not God's purpose from the first?/ The earth to be spann'd, connected by network/… The oceans to be cross'd, the distant brought near/ The lands to be welded together."[53]

American involvement in the widely woven tapestry of polar exploration burned bright and quickly, compared to the slower, sustained flame of European efforts. The creeds of individuality, competition, and idealism are easily identified in the case study of American polar exploration, especially when held in stark contrast to other contemporary efforts worldwide; this allows for a thorough examination of the mythological American Spirit. This spirit can be found in the competition of America's children, in the idealism of her dreamers, and the individuality of her people. The American Spirit *is* the spirit of exploration. The pioneer in the wagon train is the captain in the pack ice is the astronaut in orbit. Harm is done under this banner in the name of American values just as discoveries are made for the sake of American values. Lives are lost and lived for the rare chance to discover something beautiful. Lewis and Clark traversed the Missouri River, Henry Hudson charted his course through North America, and a small whaling vessel called the *George Henry* found an English ship, abandoned in the ice. Her bones live in the desk of the highest office in the United States of America, though few will know where they came from.

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# Impact of Immigration Policy Changes on Labor Force Participation Rates and Economic Growth (GDP)

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***Faculty mentors: Linda Dynan***
*Economics*

**KEYWORDS:**
labor force participation rate (LFPR), gross domestic product (GDP), immigration enforcement

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## Abstract

This study examines the relationship between immigration policy changes and their effects on labor force participation rates (LFPR) and economic growth (GDP) in the United States from 1980 to 2022. It uses the ratio of deportations to legal immigrants (R/L) as a proxy for immigration policy strictness and employs regression analysis to evaluate how fluctuations in enforcement intensity influence labor market dynamics and overall economic performance. By analyzing key labor and economic indicators, the research aims to provide insights into how immigration policies may shape workforce participation and long-term economic trends. This study contributes to ongoing debates about the role of immigration in the U.S. economy and offers a data-driven perspective to inform future policy decisions.

## Introduction

Immigration policy affects various aspects of society, from economic well-being to social integration, with significant implications for labor markets. The debate about whether immigrants displace native-born workers or help fill crucial gaps in the workforce remains ongoing. However, understanding how shifts in immigration policies influence labor market dynamics is essential. This study examines the impact of immigration policy changes on labor force participation rates and Gross Domestic Product (GDP), seeking to understand how variations in immigration laws, sometimes more open, other times more restrictive, can influence the number of people who enter or remain in the labor market. The primary aim is to assess how changes in immigration policy affect the labor force participation rate (LFPR), defined as the proportion of individuals over 16 years of age who are either employed or actively seeking work, alongside GDP growth.

Much research contributes valuable insights into issues around immigration and its effect on labor markets. Edwards and Liu (2018), for example, analyzed data from the American Community Survey (ACS) from 2005 to 2016 and found a positive correlation between native employment rates and a higher share of foreign-born workers. Their difference-in-differences approach suggests that immigrant labor can stimulate overall economic activity, challenging the common belief that immigration negatively impacts native employment.

Similarly, Holzer (2019) summarizes numerous studies and policy reports, reinforcing the argument that immigration fosters economic growth by alleviating employment shortages, particularly in areas with a scarcity of native labor. Holzer's comprehensive review provides an understanding of both the benefits and challenges that immigration presents to labor markets. He highlights how immigrant workers often fill essential roles in sectors that experience labor shortages, such as agriculture and low-skill manufacturing, thereby enabling these industries to remain competitive. However, Holzer also acknowledges the potential for wage suppression in certain industries, especially when immigration policies lead to an oversupply of labor in particular regions or sectors.

Building on this, Orrenius, Zavodny, and Gullo (2020) employed data from the ACS to examine the labor market impact of immigration. Their findings show that immigrants often occupy roles complementary to native-born workers, rather than competing directly with them. This suggests that both native and immigrant workforces stand to benefit when immigration policies align with labor market needs.

Emerson (2007) conducted a sector-specific analysis of the agricultural labor market, demonstrating that a substantial portion of agricultural workers are foreign-born. According to Emerson, changes in immigration policy directly influence labor availability and wages in this sector, highlighting the concrete effects of immigration policy on industries that depend heavily on immigrant labor.

International evidence further enriches the discussion. Fromentin's (2013) study on immigration and unemployment in France indicates that immigrant workers often experience higher unemployment rates compared to their native-born counterparts. This disparity is likely because of issues such as discrimination and mismatches in qualifications, underscoring the fact that the way immigration laws are drafted can have a big impact on how successfully immigrants integrate into the workforce.

Peri (2012) offers additional insights with a study on U.S. states, where he found that immigration has no negative effect on native workers' employment or hours worked. Instead, immigrants contributed to increased total factor productivity and worker income, suggesting that immigration can enhance overall economic efficiency and competitiveness, regardless of employment levels.

Recent political developments further underscore the relevance of this research. Policies such as mass deportations, particularly under the Trump administration, have reignited debates about the economic impacts of immigration on labor markets. This study examines how stringent immigration policies, including mass deportations and aggressive enforcement, decrease immigrant labor force participation, potentially due to fear, uncertainty, and legal challenges to employment. While native-born workers might fill some of these vacancies, industries that rely on immigrant labor could face labor shortages, wage shifts, and disruptions in economic productivity. Therefore, I hypothesize that stricter immigration policies reduce the LFPR and hinder economic growth.

## Methods

This study empirically tests the hypothesis that stricter immigration policies reduce the LFPR and that these shifts in labor market behavior have broader economic implications for economic growth. Basically, our goal is to understand how policy changes affect employment behavior over time, as well as how these changes impact the GDP. The analysis uses simple regression models to capture both the direct effect on LFPR and the subsequent impact on GDP.

Labor market information, including the LFPR, unemployment rate, and wage growth, is drawn from the Federal Reserve Economic Data and the Office of Homeland Security. Economic indicators such as GDP and recession status are included to capture broader macroeconomic conditions. Since a direct immigration policy variable is not present in the dataset, I will use the ratio of deportations to legal immigrants (R/L) as a proxy for immigration policy stringency. Higher values of

this ratio will be interpreted as representing more restrictive immigration environments, while lower values suggest less restrictive periods.

The primary dependent variables are the LFPR and GDP. The LFPR is the percentage of individuals aged 16 and over who are either employed or actively seeking work. The economic outcome is reflected by a primary indicator, the GDP. The key independent variable is the ratio of deportations to legal immigrants (R/L). Other independent variables include: Unemployment Rate, Wage Growth, Recession Indicator, and Time.

I begin the analysis by generating descriptive statistics for each key variable. Next, I create visualizations such as scatter plots that will show the relationship between LFPR and R/L, R/L and Time and between GDP and R/L. These visuals will help illustrate overall trends and guide the regression analysis. The core of the analysis involves two regression models. The first model estimates the direct effect of immigration policy stringency on labor force participation rate. The second model tests how labor force participation, shaped by immigration enforcement, impacts GDP.

The models are specified as follows:

### Model 1

$$LFPR_t = \beta_1(R/L)_t + \beta_2(Unemployment\ \ Rate_1) +$$

$$\beta_3(Recession_t) + \beta_4(Wage\ \ Growth_t) + \varepsilon_t$$

In this equation, $LFPR_t$ represents the labor force participation rate at time t, while all terms on the right-hand side (*(R/L), Unemployment Rate, Recession Indicator, Wage Growth*, and *Time*) are independent variables. The ratio of deportations to legal immigrants (R/L) serves as a proxy for immigration policy stringency. The coefficient $\beta_1$ captures the average change in LFPR associated with increased immigration enforcement, and $\varepsilon_t$ represents the error term that accounts for unobserved influences on $LFPR_t$.

The second part of the analysis evaluates the broader economic implications by examining how changes in labor force participation rate, influenced by immigration policy, affect GDP.

The following regression model is used:

### Model 2

$$GDP_t = \alpha_1(LFPR_t) + \alpha_2(R/L)_t + \alpha_3(Unemployment\ \ Rate_t) +$$

$$+\alpha_4(Recession_t) + \alpha_5(Time_t) + \upsilon_t$$

In this model, $GDP_t$ represents the level of economic output at time t. The independent variables include LFPR, the R/L ratio, unemployment rate, recession indicator, and time. The coefficient $\alpha_1$ reflects the direct effect of labor force participation on GDP, while $\alpha_2$ measures the direct impact of immigration policy stringency. The $\upsilon_t$ is the error term accounting for other unobserved factors that may affect GDP.

Together, these two models provide a comprehensive framework for evaluating the labor market and economic effects of immigration enforcement over time.

## Analysis

My dataset includes Labor Force Participation Rate (LFPR), the ratio of deportations to legal immigrants (R/L), Unemployment Rate, Wage Growth, Recession Indicator, Gross Domestic Product (GDP) and Time. The dataset includes 43 observations for each variable.

Now I present the descriptive statistics of my data covering the time period from 1980 to 2022 in Table I.

The *LFPR* has a mean of 65.02%, indicating that, between 1980 and 2022 on average, 65.02% of the working-age population is employed or actively seeking employment. The values range from a minimum of 61.70% to a maximum of 67.10%, with a variance of 2.77, showing moderate variation across the dataset. The ratio of deportations to legal immigrants (*R/L*) has a mean of 0.18, meaning that, on average, for every 100 legal immigrants, there are 18 deportations. This ratio ranges from a minimum of 0.02 to a maximum of 0.44, with a variance of 0.02, indicating relatively stable fluctuations.

*Unemployment Rate* has a mean of 6.07%, with a minimum of 3.50% and a maximum of 10.80%. Its variance of 3.06 suggests some fluctuation in joblessness across the data time. *Wage Growth* has a mean of 4.24% reflecting an average 4.24% increase in wages, though it ranges from (1.80%) to a maximum of 6.30%. *GDP* shows an average of 11508 (in billions), with a wide range from 2857 (in billions), to 26,007 (in billions). The

**Table I. Descriptive Statistics**

| Variable | Total Count | Mean | SD | Variance | Min. | Med. | Max. |
|---|---|---|---|---|---|---|---|
| LFPR | 43 | 65.02 | 1.67 | 2.77 | 61.70 | 65.60 | 67.10 |
| R/L | 43 | 0.18 | 0.14 | 0.02 | 0.02 | 0.18 | 0.44 |
| Unemployment Rate | 43 | 6.07 | 1.75 | 3.06 | 3.50 | 5.70 | 10.80 |
| Recession | 43 | 0.19 | 0.39 | 0.16 | 0.00 | 0.00 | 1.00 |
| Wage Growth | 43 | 4.24 | 1.17 | 1.37 | 1.80 | 4.10 | 6.30 |
| GDP | 43 | 11508 | 6317 | 39902183 | 2857 | 10582 | 26007 |
| Time | 43 | 22.00 | 12.56 | 157.67 | 1.00 | 22.00 | 43.00 |

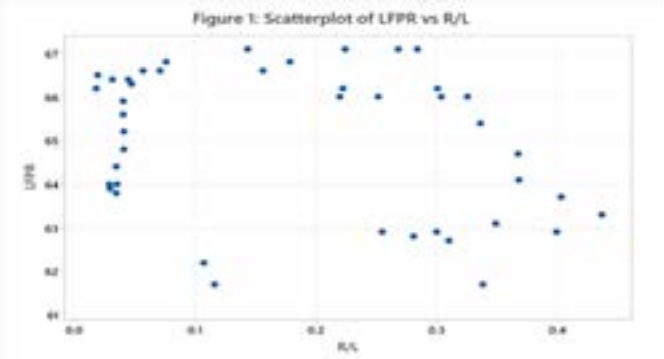


**Figure 1.** LFPR vs R/L ratio.

data points span 43 time periods, from 1980-2022. About 19% of the observations are from periods of recession.

Figure 1 is a graph of LFPR against the R/L. It shows a negative relationship between LFPR and R/L—as R/L increases, LFPR decreases. Most data points cluster at lower R/L values, with LFPR stable between 64-66. As R/L rises above 0.2, LFPR declines, with more variability at higher R/L value. The graph suggests a concave relationship so we might include a squared term for the R/L variable in our regression model.

Figure 2 is a graph of LFPR against Time. The scatterplot shows the non-linear relationship between LFPR and Time. LFPR starts around 63, rises to a peak at time = 20, and then declines. This pattern suggests that labor force participation increased for some time, possibly due to favorable economic conditions, before decreasing, possibly due to factors like economic recessions or demographic changes. The graph suggests a concave relationship so we might include a squared

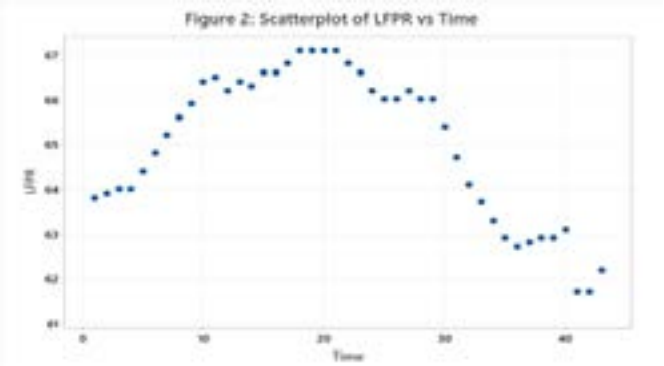


**Figure 2.** LFPR vs time. (1980 = 0)

term for the time variable in our regression model.

The scatter plot of GDP vs. R/L (Figure 3) shows a positive linear relationship. As R/L increases, GDP also increases, indicating that higher ratio of deportations to legal immigrants is associated with a rise in economic output (GDP).

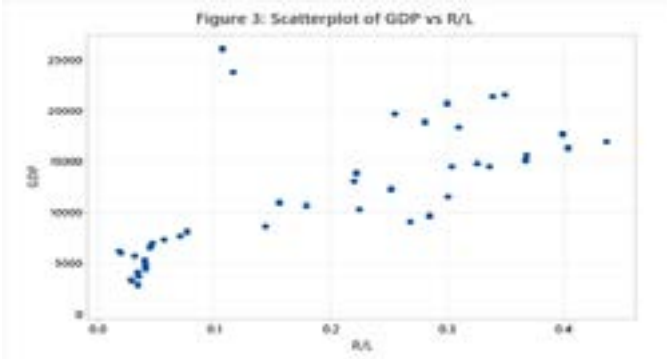


**Figure 3.** GDP vs R/L ratio.

## Results

### Model 1

The correlation matrix (Table II) highlights a few key relationships of concern. The R/L ratio has a strong negative correlation with *Wage Growth* (-0.791) and a strong positive correlation with *Time* (0.788). The strong negative correlation between R/L and *Wage Growth* (-0.791) implies that as the ratio of deportations to legal immigration increases, wage growth tends to decline significantly. This may reflect economic pressures linked to stricter immigration enforcement. Additionally, *Wage Growth* and *Time* are also strongly negatively correlated (-0.677). These strong correlations suggest potential multicollinearity, particularly between R/L and the other variables. Upon examining the variance inflation factor (VIF) values, which are reported alongside the coefficient estimates in Table IV, these relationships were found not to be statistically significant, indicating that multicollinearity was not a concern in the model.

Upon looking at the overall model, the regression appears to be statistically significant. The ANOVA results in Table III show an F-value of 153.51 with a corresponding p-value of $2.44 \times 10^{-24}$, which is far below the common significance level of 0.05. This indicates that the model explains a significant portion of the variation in the dependent variable.

The standard error (S) is 0.323970, which measures the typical distance between the observed LFPR values and the predicted values—lower values suggest better model fit. The R-squared ($R^2$) is 96.21%, meaning that approximately 96.21% of the

**Table II. Model 1 Correlation Matrix**

| | R/L | Unemployment Rate | Recession | Wage Growth |
|---|---|---|---|---|
| Unemployment Rate | -0.109 | -- | -- | -- |
| Recession | -0.082 | 0.480 | -- | -- |
| Wage Growth | -0.791 | -0.075 | 0.253 | -- |
| Time | 0.788 | -0.399 | -0.178 | -0.677 |

**Table III. Model 1 ANOVA Results**

| | df | SS | MS | F | P-Value |
|---|---|---|---|---|---|
| Regression | 7 | 112.7851 | 16.11216 | 153.5126 | $2.44\times10^{-24}$ |
| Residual | 35 | 3.673481 | 0.104957 | -- | -- |
| Total | 42 | 116.4856 | -- | -- | -- |

variation in the LFPR is explained by the model.

Regression Equation:

$$LFPR = 61.070 - 0.0468(Unemployment\ \ Rate) +$$

$$0.239(Recession) + 0.361(Wage\ \ Growth)\ \ -\ \ 2.00(R/L)^2 -$$

$$0.45(R/L)\ \ + 0.4465(Time)\ \ -\ \ 0.010942(Time^2)$$

The regression equation estimates the LFPR using seven variables: *(R/L)*, *Unemployment Rate*, *Recession*, *Wage Growth*, *Time*, the square of *(R/L)*, and the square of *Time*. The constant term is 61.070, representing the baseline LFPR when all predictors are zero. The coefficient for *(R/L)* is -0.45, indicating that a one percentage point increase in the ratio of deportations to legal immigrations leads to a 0.45 percentage point decrease in LFPR. The squared term of (R/L) has a coefficient of -2.00, suggesting that while increases in (R/L) initially reduce LFPR, this effect diminishes as (R/L) increases further. However, both (R/L) and $(R/L)^2$ are not statistically significant with p-values of 0.857 and 0.724, respectively.

*Wage Growth* significantly affects LFPR, with a coefficient of 0.361, meaning that one percentage point increase in wage growth leads to a 0.361 percentage point increase in LFPR (p = 0.002). Time also plays a crucial role, showing that LFPR declines by 0.010942 percentage points per year (p < 0.001), indicating a long-term downward trend in LFPR. The

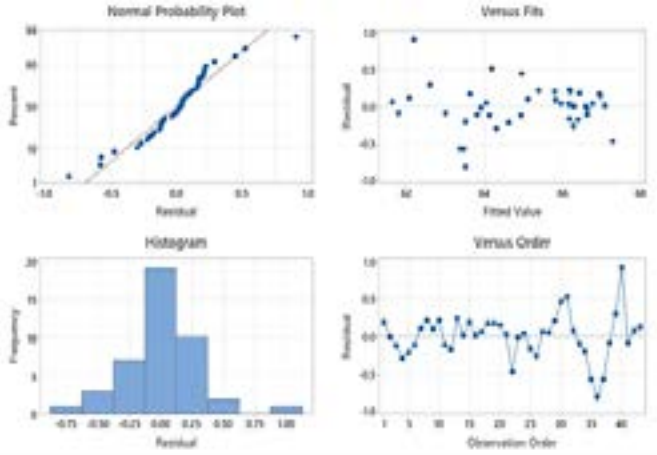


**Figure 4.** Normality diagnostics of residuals for Model 1 LFPR.

*Unemployment Rate* has a negative coefficient (-0.0468), suggesting that higher unemployment may reduce LFPR, but this effect is not statistically significant (p = 0.394). Similarly, the *Recession* variable has a small positive effect (0.239), but with a high p-value (0.192), it is not significant. Overall, the model shows that LFPR is most strongly and significantly influenced by wage growth and time.

After evaluating the normality of the residuals shown in Figure 4, the results suggest that the assumption of normally distributed error terms is met. The normal probability plot shows that the residuals roughly follow a straight line, with only minor deviations, particularly at the tails. The versus fit plot displays no clear pattern, indicating a reasonably consistent spread of residuals across fitted values. Additionally, the histogram of residuals appears relatively symmetric, supporting the assumption of normality for the residuals.

## Model 2

The correlation matrix in Table V shows the strength and direction of linear relationships among the explanatory variables. The most notable correlation in the matrix is the

**Table IV. Model 1 Regression Coefficients**

| Term | Coefficient | SE Coefficient | 95% CI | T-value | P-value | VIF |
|---|---|---|---|---|---|---|
| Constant | 61.070 | 0.940 | (59.163, 62.977) | 65.00 | 0.000 | -- |
| Unemployment Rate | -0.0468 | 0.0542 | (-0.1567, 0.0632) | -0.86 | 0.394 | 3.59 |
| Recession | 0.239 | 0.180 | (-0.126, 0.603) | 1.33 | 0.192 | 2.00 |
| Wage Growth | 0.361 | 0.106 | (0.145, 0.577) | 3.40 | 0.002 | 6.21 |
| $(R/L)^2$ | -2.00 | 5.61 | (-13.39, 9.40) | -0.36 | 0.724 | 38.55 |
| R/L | -0.45 | 2.50 | (-5.53, 4.62) | -0.18 | 0.857 | 4.66 |
| Time | 0.4465 | 0.0310 | (0.3836, 0.5095) | 14.40 | 0.000 | 6.71 |
| $Time^2$ | -0.010942 | 0.000527 | (-0.012012, -0.009873) | -20.77 | 0.00 | 23.05 |

**Table V. Model 2 Correlation Table**

| | LFPR | R/L | Unemployment Rate | Recession |
|---|---|---|---|---|
| R/L | -0.293 | _ | _ | _ |
| Unemployment Rate | -0.044 | -0.109 | _ | _ |
| Recession | -0.074 | -0.082 | 0.480 | _ |
| Time | -0.503 | 0.788 | -0.399 | -0.178 |

**Table VI. Model 2 ANOVA Results**

| | df | SS | MS | F | P-Value |
|---|---|---|---|---|---|
| Regression | 5 | 1.66E+09 | 3.33E+08 | 1028.916 | 1.29E-38 |
| Residual | 37 | 11967007 | 323432.6 | -- | -- |
| Total | 42 | 1.68E+09 | -- | -- | -- |

strong positive relationship between *R/L* and *Time* (0.788), suggesting that the ratio of deportations to legal immigrations has increased over time. Additionally, *LFPR* and *Time* show a moderate negative correlation (-0.503), indicating a decline in labor force participation as time progresses. Upon examining the VIF values, which are reported alongside the coefficient estimates in Table VII, these relationships were found not to be statistically significant, indicating that multicollinearity was not a concern in the model.

Upon looking at the overall model for GDP, the regression appears to be statistically significant. The ANOVA table (Table VI) shows an F-value of 1028.92 with a corresponding p-value of $1.29 \times 10^{-38}$, which is far below the common significance level of 0.05. This indicates that the model explains a significant portion of the variation in GDP.

The Standard Error of this regression model is 568.711 indicating the average deviation of observed values from predicted values. The adjusted R-squared ($R^2$) is 99.19%. The model accounts for 99.29% of the variability in GDP, indicating an outstanding fit.

Regression Equation:

$$GDP = 36376 - 522.6(LFPR) - 4389(R/L) - 163.9(Unemployment\ Rate) + 476(Recession) + 492.1(Time)$$

This equation and the values from the regression reported in Table VII suggest that GDP is influenced by these variables: *LFPR, R/L, Unemployment Rate*, and *Time*. For one percentage point increase in *LFPR*, GDP decreases by 522.6 units (in billions), holding other factors constant. For one percentage point increase in *R/L*, GDP decreases by 4,389 units (in billions), suggesting that higher ratio of deportations to legal immigration negatively impacts GDP. For one percentage point increase in the *Unemployment Rate*, GDP decreases by 163.9 units (in billions). As *Time* progresses by one year, GDP increases by 492.1 units (in billions), indicating economic growth over time.

The constant is 36,376 (in billions), which is the estimated GDP when all predictor variables are zero. The coefficient for *LFPR* is -522.6, and the p-value is 0.000, making it highly statistically significant. This shows that LFPR negatively impacts GDP. The coefficient for *R/L* is -4,389, and the p-value is 0.001, indicating a statistically significant negative relationship between R/L and GDP. The coefficient for *Unemployment Rate* is -163.9, with a p-value of 0.026, meaning this is statistically significant, suggesting that higher unemployment negatively impacts GDP. The coefficient for *Time* is 492.1, with a p-value of 0.000, making it highly statistically significant, indicating that time is a strong predictor of GDP growth.

**Table VII. Model 2 Regression Coefficients**

| Term | Coefficient | SE Coefficient | 95% CI | T-value | P-value | VIF |
|---|---|---|---|---|---|---|
| Constant | 36376 | 4758 | (59.163, 62.977) | 7.64 | 0.000 | - |
| LFPR | -522.6 | 68.3 | (-661.1, -384.2) | -7.65 | 0.000 | 1.68 |
| R/L | -4389 | 1197 | (-6814, -1963) | -3.67 | 0.001 | 3.47 |
| Unemployment Rate | 163.9 | 70.7 | (-307.1, -20.7) | -2.32 | 0.026 | 1.98 |
| Recession | 476 | 255 | (-41, 993) | 1.86 | 0.070 | 1.31 |
| Time | 492.1 | 16.3 | (459.1, 525.2) | 30.14 | 0.000 | 5.46 |

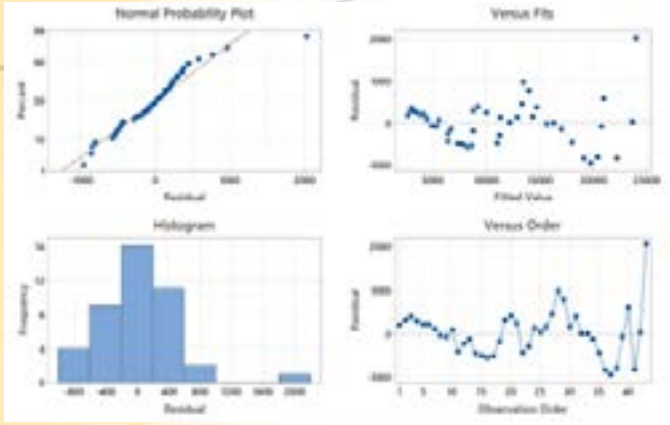

**Figure 5.** Normality diagnostics of residuals for Model 2 GDP.

After evaluating the normality of residuals shown in Figure 5, I obtained the following results.

The residuals roughly follow a straight line, indicating that they are approximately normally distributed. This suggests that the assumption of normality for the residuals is met. From the versus fit plot, we can see that the residuals are randomly scattered around zero with no clear pattern. This suggests that the model fits the data well and that the variance of residuals is constant.

## Discussion and Conclusions

This study explored the relationship between immigration enforcement intensity and its economic implications, particularly through the Labor Force Participation Rate (LFPR) and Gross Domestic Product (GDP). The regression analysis revealed that Time and Wage Growth were the most significant predictors of LFPR. While the ratio of deportations to legal immigration (R/L) had a negative coefficient, it was not statistically significant, suggesting no strong direct effect on LFPR. Similarly, unemployment and recession variables were also not significant in predicting LFPR. Therefore, the first part of the hypothesis, that stricter immigration policies reduce LFPR, was not fully supported by the statistical evidence.

In contrast, the GDP regression model strongly supported the second part of the hypothesis. LFPR had a statistically significant negative effect on GDP, as did R/L and the unemployment rate. Meanwhile, time was a strong positive predictor of GDP growth. These results align with the expectation that shifts in labor force dynamics, driven by immigration policy can impact broader economic productivity.

The findings align closely with Edwards and Liu (2018), who emphasized the positive role of immigrant labor in enhancing overall employment and economic activity. Holzer (2019) and Orrenius et al. (2020) also support the idea that immigrant labor is often complementary to native employment and necessary for economic efficiency. Although this study did not directly observe sector-level impacts, the broader decline in LFPR is consistent with Emerson's (2007) concern that immigration enforcement can negatively affect industries dependent on immigrant labor. Furthermore, the observed productivity-related outcomes support Peri's (2012) conclusion that immigration enhances total factor productivity, even if not always reflected in short-term employment changes.

In summary, this study contributes to the growing body of research highlighting the economic trade-offs of strict immigration policy. While LFPR itself may not be directly and significantly impacted by enforcement metrics, the broader implications on GDP are substantial. The evidence suggests that over time, stricter immigration enforcement could undermine economic growth by disrupting labor availability, particularly in sectors where immigrant workers play a key role.

This study has several important limitations. First, while the ratio of deportations to legal immigration (R/L) was used as a proxy for immigration enforcement, it may not fully reflect the breadth and nuance of immigration policies. Elements such as visa regulations, policy discretion at state and local levels, and the role of undocumented immigration are not captured by this metric, potentially limiting the validity of R/L as a comprehensive measure of enforcement intensity. Second, the LFPR model showed that R/L and its squared term were statistically insignificant, which may indicate either a lack of true effect or model misspecification. It's possible that labor force behavior is influenced by more granular or indirect effects of immigration policy—such as fear of deportation or reduced inflow of immigrant labor, which this model could not account for. Third, the small sample size (n = 43) reduces the statistical power of the regression analysis, especially for detecting smaller or more complex effects. This limits the generalizability of the findings and may increase the likelihood of Type II errors.

Future research should aim to overcome these limitations in several ways. First, using state-level or sector-specific data could better reveal the heterogeneous effects of immigration policies across industries and geographic areas. Second, including more refined policy indicators, such as E-Verify mandates, sanctuary policies, or visa issuance trends, would allow for a more nuanced evaluation of policy strictness. Third, disaggregating the labor force by skill level, age, or immigration status may clarify how specific subgroups are affected by policy changes. Finally, longitudinal designs that track pre- and post-policy implementation periods could help establish causal links between immigration enforcement and labor market or GDP outcomes more convincingly. By exploring these areas, future research could provide a more comprehensive understanding of how immigration policy shapes the labor market and broader economic outcomes.

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Disclosure: I used AI assistance for paraphrasing and organizing ideas to improve clarity and structure. While the core analysis and arguments are my own, AI helped refine the wording and ensure coherence.

# The Potential Impact of Implementing Tariffs on Imports on US Inflation Rates

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**KEYWORDS:**
tariffs, inflation, imports

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Abhinam Joshi graduated Summa Cum Laude from Northern Kentucky University in December 2025. He obtained a Bachelor's degree in Economics and Data Analytics & Statistics. Abhinam enjoyed working on the paper and was grateful to have an opportunity to work with Dr. Dynan on this paper as a part of seminar paper which allowed him apply economic concepts learned from all the classes. He is currently working full time as a Data Engineer/ Analyst at Great American Insurance Group.

## Abstract

This research examines the potential impact of implementing tariffs on inflation. The study hypothesizes that a tariff war will lead to inflation and hurt the economy. However, the Trump administration is pursuing such a policy. This research will allow us to better assess whether the actions taken by President Trump are reasonable or not. To examine this, the study conducts a regression analysis with the inflation rate as the dependent variable. The independent variables will include tariff rates, interest rates, and stock market indices.

## Introduction

This research examines the potential impact of implementing tariffs on imports on inflation rates in the United States. Since the United States is one of the biggest importers of the world, worth approximately $3.8 trillion (CIA), imposing tariffs on their imports could have significant economic consequences. Tariffs, by increasing the cost of imported goods, may contribute to higher consumer prices, leading to inflationary pressures.

The impact of tariffs on consumer prices and overall economic welfare has been a widely debated topic in the economics literature. Amiti, Redding, and Weinstein (2019) analyzed the effects of the 2018 U.S. tariffs and found that they resulted in increased prices for American consumers. Their study provided empirical evidence that the costs of tariffs were largely passed on to consumers, leading to higher prices without substantial benefits to domestic producers. This supports the argument that tariffs, when imposed on major trading partners, can have inflationary effects by raising the overall cost price of goods.

Further supporting this argument, Peters & McKay (2018) examined the specific impact of tariffs on the plastic surgery industry, finding that increased tariffs on imported medical-grade plastics led to higher costs for essential materials. This sector-specific analysis demonstrates how tariffs can disrupt industries reliant on imported components, further contributing to inflationary pressures in the economy. Their findings underscore how tariffs can impact specific industries that underlie broad economic indicators and identify variation in inflation across different sectors. Furceri et al. (2018) also discusses the effects imposed by the tariff alongside other macroeconomic impacts of tariff such as interest rates, productivity and welfare. The study was conducted using impulse response functions from local projections on a panel of annual data spanning 151 countries over 1963-2014. While he asserts that the change in trade volume was unlikely due to offsetting exchange rate appreciations, he concludes that tariffs have significant negative impact on output and productivity while also contributing to unemployment and higher inequality, thereby reducing welfare. This provides additional evidence that tariffs are associated with higher inflation.

However, Batra (2001) provides a counterargument, questioning the direct inflationary effects of tariffs. His study examined historical tariff implementations and found that in certain cases, tariffs did not result in inflation but instead led to price stabilization or even a decrease in inflation. He argued that historically in the U.S., tariffs have led to a shift in labor force from low-wage agriculture into high-wage manufacturing which led to strong output growth. This increase in supply then led to deflation. He used production functions and built on them to support his theory and observations. This historical perspective suggests that the inflationary impact of tariffs is not universally applicable and depends on specific economic conditions; in this case the economy was highly agrarian and was yet to industrialize. Additionally, the inflationary impact of tariffs is highly context-dependent, influenced by factors such as supply chain structures and monetary policy which may change the effect that tariffs have on an economy today compared to the 1800s.

Beyond the U.S., the effects of tariffs extend to international economies as well. Aba (2021) investigated the consequences of the U.S.-China trade war on economies of countries belonging to the Association of Southeast Asian Nations, particularly Indonesia, Vietnam, and Cambodia. The study found that institutional strength such as political stability of the country and a strong legal framework played a crucial role in determining how these economies responded to the trade war. While some countries faced economic downturns due to trade disruptions, others were able to capitalize on the shifting trade dynamics. This highlights the broader global implications of tariff policies, demonstrating that such measures not only affect domestic inflation but also create economic ripple effects across international markets.

Lechthaler (2017) provides additional insight into the role of monetary policy in determining optimal tariffs. His research suggests that the interaction between tariffs and monetary policy is crucial in shaping economic outcomes. Lower interest rates, for example, can reduce the inflationary impact of tariffs by stimulating domestic demand, while restrictive monetary policies may necessitate higher tariffs to protect domestic industries. This highlights the importance of a balanced policy approach in managing the effects of tariffs on inflation but also introduces the possibility of limiting the inflationary pressure from tariffs using other monetary tools. For instance, during the U.S.-China trade war, the Federal Reserve's decision to lower interest rates in 2019 helped counteract some of the economic slowdown caused by increased tariffs, demonstrating how monetary policy can be used to offset tariff-induced inflationary pressures.

Based on the existing literature and economic theory, this research hypothesizes that implementing tariffs on imports will lead to inflationary pressures in the United States. Given the significant trade volumes with these countries, tariffs are likely to increase production costs, reduce supply chain efficiency, and ultimately raise consumer prices. Furthermore, a prolonged tariff war with key trading partners is expected to exacerbate these inflationary effects, reinforcing the argument that these policies can have unintended economic consequences. This study aims to provide empirical evidence supporting this hypothesis and offer policy recommendations to mitigate potential adverse effects. The next section describes the data sources and regression methodology, which is followed by presentation of descriptive statistics and empirical results, and the article concludes with discussion of findings and limitations.

## Methods

This research employed a quantitative empirical analysis to investigate the relationship between tariffs imposed by the U.S. and inflation rates in the United States. The paper hypothesized that the tariffs would lead to an increase in the inflation rates.

The study tested the hypotheses using the following model:

$$Inflation\ Rate_t = \beta_0 + \beta_1(Tariff\ Rate_t)^2 + \beta_2(Tariff\ Rate_t)$$

$$+\beta_3(Interest\ Rate_t) + \beta_4(Stock\ Market\ Index_t)$$

$$+\beta_5(Trade\ Volume\ Change_t) + \beta_6(Year) + \epsilon_t$$

This analysis used annual data from 1955 through 2024, resulting in 70 observations. All variables were measured annually. A multiple linear regression model with time series data was estimated. The dependent variable is the inflation rate (Inflation Ratet), measured as the year-over-year percentage change in the Consumer Price Index (CPI) from the U.S. Bureau of Labor Statistics. Independent variables include: (1) Average tariff rate in percent (Tariff $Rate_t$) from the United States International Trade Commission; (2) Federal funds effective rate (Interest $Rate_t$) in percent from FRED; (3) Annual S&P 500 return in percent (Stock Market $Index_t$) from MarketWatch; (4) Year-over-year change in import volume in billions of dollars (Trade Volume $Change_t$) from the U.S. Census Bureau; and (5) Year (Year) as a time trend variable. The $\beta_0$ represents the y-intercept, indicating the predicted inflation rate when all independent variables equal zero based on the model, while $\epsilon_t$ represents the error term capturing unaccounted factors affecting inflation rate.

These datasets were merged using year (time-series variable) to create a structured dataset for analysis.

After the dataset was constructed, descriptive statistics, graphs of the relationships between key variables, and a test for multicollinearity first with a correlation matrix and variance inflation factors were provided. Since the proposed regression was a time series model, Newey West standard errors were used because statistical tests found there was autocorrelation in the error terms.

**Table I. Descriptive Statistics**

| Statistic | Inflation Rate | Tarrif Rate | Interest Rate | Stock Market Index | Trade Volume Change |
|---|---|---|---|---|---|
| Mean | 3.63 | 3.67 | 4.65 | 8.89 | 8.69 |
| SD | 2.78 | 2.10 | 3.60 | 16.45 | 9.16 |
| Min | 0.09 | 1.20 | 0.07 | -38.49 | -13.20 |
| Max | 13.29 | 7.60 | 18.90 | 38.06 | 38.39 |
| Count | 70.00 | 70.00 | 70.00 | 70.00 | 70.00 |

## Results and Discussion

Table I shows the basic descriptive statistics for variables included in the regression analysis. Data consist of 70 yearly observations from 1955 to 2024. In this period, the U.S. had a mean Inflation Rate of 3.63% and a standard deviation of 2.78 indicating high variability. This is supported by the minimum and maximum values, since in this period the minimum Inflation Rate is 0.09 whereas the maximum Inflation Rate is 13.29.

The mean Tariff Rate imposed by the U.S. was 3.67% on all products while the standard deviation is 2.1%. The minimum is 1.2% while the maximum is 7.6%. Tariffs had less variability than the inflation rate for this time period. As for interest rates, the mean Interest Rate was 4.65% with a standard deviation of 3.6%. The minimum Interest Rate in this time period was 0.07% while the maximum was 18.90%. The range seems to be quite high, probably because of various historical economic crises (e.g., interest rates during the 2008 financial crisis and some years after that were less than 1%).

For the final two variables (Stock Market Index and Trade Volume Change), the mean and the standard deviation of annual returns of the S&P index were 8.89 and 16.45, respectively, with a minimum of –38.49 and a maximum of 38.06. Similarly, the mean and the standard deviation of annual change in import volumes was $8.69 billion and $9.16 billion, respectively. The minimum annual change was $–13.20 billion while the maximum was $39.29 billion.

Based on the time series graph in Figure 1, some spikes in inflation rates during the late 1970s and post-COVID years (early 2020s) can be seen. However, for tariffs there does not seem to be a significant spike in any of the years, but it seems to follow the trend of inflation rate after 1970s. In general, the trend line for both inflation rates and tariff rates seems to follow


**Figure 1.** Time series of U.S. inflation rates (blue) and tariff rates (red) from 1955 - 2024

each other after 1970s (Post World War Era). Both inflation and tariff rates went up during COVID-19 era (Around 2020).

Based on the graph there is not a clear relationship between these two variables, however, it seems that the inflation rate was high when the tariff rate was moderate (3-5%). While this does not provide any conclusions, it might be something to note (causation indeterminant). The graph is concave, suggesting that it may be appropriate to include a tariff rate squared term in addition to the tariff rate, to capture the nonlinear effect observed in the graph.

The correlation data in Tables II and III provided a preliminary test of the strength and direction of the relationship between pairs of independent variables. Multicollinearity was not an issue for the tariff variable since it was squared. There was a slight concern of multicollinearity between inflation rate and interest rate (Coefficient = 0.7539), however, the Variance Inflation Factor (VIF) for the Interest Rate variable ruled out the possibility of multicollinearity. Since the paper tested for

**Table II. Correlation Matrix**

| | Inflation Rate | Year | Tariff Rate | Interest Rate | Stock Market Index | Trade Volume Change |
|---|---|---|---|---|---|---|
| Inflation Rate | 1 | | | | | |
| Year | -0.1656 | 1 | | | | |
| Tariff Rate | 0.0383 | -0.873 | 1 | | | |
| Interest Rate | 0.7539 | -0.3632 | 0.1835 | 1 | | |
| Stock Market Index | -0.1930 | 0.0842 | -0.0502 | -0.0390 | 1 | |
| Trade Volume Change | 0.4684 | -0.2720 | 0.1872 | 0.3488 | -0.1556 | 1 |

**Table III. Correlation Parameters**

| Variable | VIF | 1/VIF |
|---|---|---|
| Tariff Rate | 48.03 | 0.020822 |
| (Tariff Rate)$^2$ | 41.08 | 0.024342 |
| Year | 5.27 | 0.189658 |
| Interest Rate | 1.766 | 0.566778 |
| Trade Volume Change | 1.21 | 0.826654 |
| Stock Market Index | 1.06 | 0.943819 |
| Mean VIF | 16.40 | |

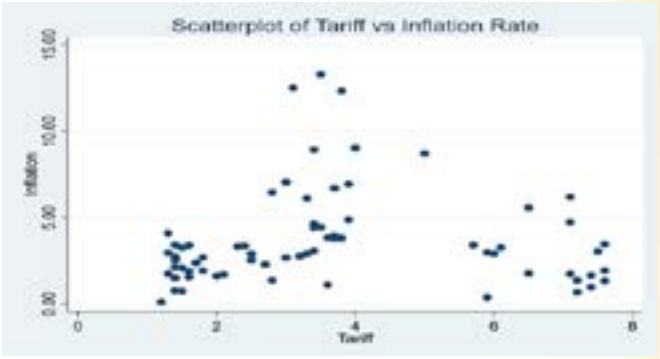


**Figure 2.** Scatter plot illustrating the relationship between U.S. inflation rates and average tariff rates imposed by the U.S. from 1955 to 2024

autocorrelation separately, VIF for year variables was not a concern.

## Test of autocorrelation

The Durbin-Watson statistic resulted in 1.048 indicating positive autocorrelation in the residuals, meaning that errors in one year were correlated with errors in subsequent years. To address this, the study used Newey-West standard errors, which adjusted the standard errors for autocorrelation and heteroskedasticity, making statistical inference more reliable in time series settings.

## Regressions

Due to the concern of autocorrelation present in the dataset, the study used regression with Newey-West standard errors to address the autocorrelation.

First, a standard ordinary least squares (OLS) regression was conducted to evaluate the general model. The results are shown in Table IV.

Since the R-squared or adjusted R-squared does not change when Newey-West standard errors are used, the model was able to explain around 64.97% of the variability in inflation (Adj. $R^2$=0.6497).

Upon conducting the regression analysis with Newey-West standard error, the overall regression was significant as indicated by the p-value < 0.0001 (F=15) for the F-test (Table

**Table IV. OLS Results**

| | |
|---|---|
| Number of observations | 70 |
| F(6, 63) | 22.33 |
| Prob > F | 0.000 |
| $R^2$ | 0.6801 |
| Adjusted $R^2$ | 0.6497 |
| Root Mean Square Error | 1.6448 |

**Table V. Regression with Newey-West Standard Errors**

| Regression with Newey-West standard errors | Number of Observations | 70 | | | |
|---|---|---|---|---|---|
| | F(6, 63) | 15.00 | | | |
| | Prob > F | 0.000 | | | |
| Inflation | Coefficient | Newey-West Standard Error | t | P > \|t\| | 90% confidence interval |
| Year | 0.0316912 | 0.0254075 | 1.25 | 0.217 | -0.0107241 ; 0.0741066 |
| Tariff Rate | 1.269832 | 0.6978111 | 1.82 | 0.074 | 0.1049042 ; 2.434759 |
| (Tariff Rate)2 | -0.1346223 | 0.0700836 | -1.92 | 0.059 | -0.25162 ; -0.0176246 |
| Interest Rate | 0.4961906 | 0.089529 | 5.54 | 0.000 | 0.3467307 ; 0.6456505 |
| Stock Market Index | -0.0282113 | 0.0124735 | -2.26 | 0.027 | -0.0490346 ; -0.0073879 |
| Import Volume Change | 0.0678373 | 0.0336114 | 2.02 | 0.048 | 0.0117263 ; 0.1239482 |
| constant | -64.32882 | 51.56627 | -1.25 | 0.217 | -150.4137 ; 21.75602 |

V). Based on the 0.1 significance level, only the Year variable was not significant in the model. The coefficients of the significant variables would be interpreted as follows. First, the tariff variables showed a nonlinear relationship with inflation. Higher tariffs were associated with increased inflation at a decreasing rate, as indicated by the positive coefficient on the linear tariff term and negative coefficient on the squared tariff term. Second, a 1 percentage point increase in the interest rate was associated with approximately a 0.50 percentage point increase in inflation, holding other variables constant ($t = 5.54$, $p < 0.001$). Thirdly, a 1 percentage point increase in S&P 500 annual returns was associated with approximately a 0.03 percentage point decrease in inflation ($t = -2.26$, $p = 0.027$). Finally, a $1 billion increase in import volume change was associated with approximately a 0.07 percentage point increase in inflation ($t = 2.02$, $p = 0.048$).

## Conclusion

The analysis supported the hypothesis that tariffs increase inflation, showing a positive non-linear relationship between tariff rates and inflation rates. The observed positive non-linear relationship between tariff rate (as the explanatory variable) and inflation rate indicated that while higher tariffs do contribute to rising inflation, the impact lessens at higher levels.

These findings were consistent with the literature, particularly the work of Amiti, Redding, & Weinstein (2019), who found that tariffs imposed on major trading partners tend to raise the overall price of goods, contributing to inflation. Additionally, the analysis highlighted other potential influences on inflation such as movements in the S&P 500 index and changes in import volume, suggesting that inflation is a multifaceted issue influenced by both policy and market dynamics.

### Limitations

It is important to acknowledge several limitations of this analysis. First, while the original hypothesis was supported, this type of analysis does not demonstrate causality. Secondly, the original intent was to focus exclusively on the United States' major trading partners: namely Canada, Mexico, and China. However, constructing country-specific tariff series for the full sample period would require substantial time to compile manually relative to the scope of this project, so the aggregated U.S. tariff measures were used instead, which still captured the broad trend in trade policy over time. Additionally, due to limited availability of historical data for some model variables prior to 1955, the final dataset included only 70 observations, falling short of the initial target of at least 100 observations. The model also omits potentially important variables such as oil prices and money supply growth, which may influence inflation. Future research incorporating these controls and country-specific tariff measures would strengthen these findings.

### Areas for Future Research

Future research could examine the effects of tariffs on a country-specific basis, allowing for a comparative analysis of their impact on major trading partners such as China versus smaller partners like Australia. Additionally, further studies may explore the broader economic implications of tariffs, including their influence on global stock markets or their role in shaping the growth of domestic industries.

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## The NKU Journal of Student Research

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